FIELD GUIDE TO THE CULTIVATED EUCALYPTS (MYRTACEAE) AND HOW TO IDENTIFY THEM[1]

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Abstract

This paper provides identification keys that are based entirely on morphological features to commonly and widely cultivated eucalypts, encompassing *Eucalyptus* L'Hér., *Angophora* Cav., and *Corymbia* K. D. Hill & L. A. S. Johnson in the Myrtaceae Juss. The key includes 173 taxa: one species of *Angophora*, nine species of *Corymbia*, and 163 species of *Eucalyptus*. Evidence for cultivation was determined by accounts in the literature, herbaria, personal communications, and observations of living trees in cultivation in Europe, North America, Africa, and Australia. The locations, prevalence of cultivation, and naturalization of several eucalypt species are discussed.

Key words: *Angophora*, *Corymbia*, eucalypt, *Eucalyptus*, Myrtaceae.

In 1774, at the Royal Botanic Gardens at Kew, England, the messmate (*Eucalyptus obliqua* L'Hér.) became the first cultivated eucalypt. Since that time, hundreds of species have been introduced into cultivation in temperate, tropical, and subtropical countries worldwide. Eucalypts are now second only to the pines as the most extensively planted trees in the world. They are grown for lumber, paper pulp, pilings and posts, fuel wood, medicinal products, tannins, oils, and as windbreaks and ornamentals. More than 150 of the approximately 900 eucalypts are regularly and widely grown (McClatchie, 1902; Boland et al., 1980; Wrigley & Fagg, 2010). In many countries where cultivated eucalypts have become prominent features of the landscape, they are admired for their many uses and aesthetic value while at the same time demonized as foreign invaders, and over 70 species have been observed reproducing on their own outside cultivation (Hussey et al., 1997; Forsyth et al., 2004; Ritter & Yost, 2009; Rejmánek & Richardson, 2011a).

In the current, most widely accepted classification, the eucalypts constitute three genera: *Angophora* Cav. with 10 species, *Corymbia* K. D. Hill & L. A. S. Johnson with 95 species, and *Eucalyptus* L'Hér. with approximately 760 species (Slee et al., 2006). *Angophora* was segregated from *Eucalyptus* by Cavanilles (1797) on the basis of the opposite adult leaves, presence of sepals, and absence of an operculum (bud cap or fused perianth). Nearly 200 years later, two Australian botanists, Kenneth Hill and Lawrence Johnson, combined two *Eucalyptus* subgenera, *Blakella* L. D. Pryor & L. A. S. Johnson ex Brooker and *Corymbia* (K. D. Hill & L. A. S. Johnson) Brooker (bloodwoods, ghost gums, and spotted gums), and described the new genus *Corymbia* (Pryor & Johnson, 1971; Hill & Johnson, 1995). This taxonomy was corroborated by molecular phylogenetic work, revealing that *Corymbia* is more closely related to *Angophora* than to *Eucalyptus* (Ladiges et al., 1995; Udovicic et al., 1995; Steane et al., 2002). Subsequently, Brooker (2000) proposed a less widely accepted taxonomic scheme with one genus, *Eucalyptus*, divided into seven subgenera, including *Corymbia* and *Angophora*. In general, *Corymbia* can be distinguished from *Eucalyptus* by the presence of discolorous leaves (abaxially lighter), terminal inflorescences, and large, urn-shaped fruits. Unfortunately, there are species of *Corymbia* that lack one or more of these easily recognized characteristics and several species of *Eucalyptus* that exhibit them.

Eucalypts are cultivated in all tropical, subtropical, and Mediterranean climate areas of the world. Although they were initially grown as horticultural oddities, foresters quickly discovered their potential as commercial plantation trees. Social engineers, planners, and entrepreneurs have promoted worldwide eucalypt planting for the last 150 years because of their many valuable characteristics—they are

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readily propagated from seed, grow fast, thrive in degraded soils and dry climates, can sustain regular coppicing, and are generally pest free. Between 10 and 20 species are widely grown in large plantations destined for use in paper pulp and other forestry products, whereas hundreds of others are grown for honey production, for shade, and as windbreaks and ornamentals. The most commonly grown species are *Eucalyptus globulus* Labill. (primarily in Australia, Central and South America, California, Spain, and Portugal), *E. grandis* W. Hill and hybrids between *E. grandis* and *E. urophylla* S. T. Blake (primarily in wetter areas including Brazil, Uruguay, Hawaii, China, South Africa, Congo, Zimbabwe, and Southeastern Asian countries), and *E. camaldulensis* Dehnh. (primarily in more arid areas of Africa, western North America, Peru, and the Mediterranean sea basin). More than half of the approximately 20 million hectares under eucalypt cultivation are in India (20% of total cultivated area), Brazil (19%), and China (13%) (Wang & Brooker, 1991; Florence, 1996; Turnbull, 1999; Cossalter & Pye-Smith, 2003; Iglesias-Trabado & Wilstermann, 2009; FAO, 2010).

This long history of widespread eucalypt planting has resulted in several species becoming controversial in the regions where they are now conspicuous features of the landscape. Researchers continue to debate the effects of eucalypt plantations on the natural ecosystems, biodiversity, wildlife, and ecosystem services (Poore & Fries, 1985; Sax, 2002; Lindenmayer & Hobbs, 2004; Lockwood & Gilroy, 2004; Díaz-Balteiro & Rodríguez, 2006; Proença et al., 2010; Wang et al., 2011). In general, eucalypts are less successful at invading natural areas than are several species of pines (e.g., *Pinus radiata* D. Don and *P. pinaster* Besser), other tree species in the Myrtaceae (e.g., *Melaleuca* L. spp. and *Psidium* L. spp.), and tree species in the Fabaceae (e.g., species of *Acacia* Mill. and *Prosopis* L., *Leucaena leucocephala* (Lam.) de Wit, and *Robinia pseudoacacia* L.) (Bargali et al., 1993; Richardson, 1998; Pyšek et al., 2004; Mooney et al., 2005; Rejmánek & Richardson, 2011a, 2011b). Several hypotheses have been proposed for the poor performance of eucalypts as weeds, even though they are widely planted. Eucalypts have limited, short distance, wind-dispersed seeds; generally lack compatibility with soil mycorrhizal fungi; and exhibit low levels of seedling recruitment because of their small, exalbuminous seeds (Brooker & Kleinig, 1999, 2002, 2004; Williams & Woinarski, 1997; Pampolina et al., 2002; Díez, 2005; Forrester et al., 2006; Rejmánek & Richardson, 2011b).

Eucalypt identification, although crucial in many situations, is often difficult. This difficulty is exacerbated when the provenance of naturalized or cultivated trees is unknown. I present here an identification guide to the world's most widely grown eucalypts—a group of species that exhibit the gamut of diversity in the genus, with greatly varied bark, leaves, and reproductive structures. This identification key relies entirely on morphological characters (and not place of origin) and prioritizes nonreproductive structures that are perennially present. The correct identification of many species, however, will often require examination of flowers and fruit.

Materials and Methods

This study was based on the morphological analysis of living specimens of eucalypt species on several continents (Europe, North America, Africa, and Australia). Herbaria were visited, and vouchered specimens from cultivated and wild areas were used in morphological analysis for preparation of the key. Herbaria visited in which specimens were examined (cited, according to abbreviations from Holmgren et al., 1990) include: South Africa (BOL, CT, SAM), Hawaii (HAW, PTBG), Australia (BRI, MEL, KPBG, UWA), the continental United States (ASU, CAS, FTG, LA, OBI, SD, UC), and Europe (K, UNEX). Evidence for cultivation was determined by accounts in the literature, herbaria, personal communications, and observations of living trees.

Genus-level Description and Characters Important for Taxonomic Identification

The name *Eucalyptus* was originally published in 1788 by a French botanist living in London named Charles Louis L'Héritier de Brutelle in a description of plants growing at the Royal Botanic Garden at Kew. The genus name is derived from the Greek "eu," meaning "well," and "kalyptos," meaning "covered," referring to the bud cap or operculum (a fused perianth).

At maturity eucalypts become small to large trees (Fig. 1A–C), multistemmed small trees (mallees), or shrubs (Fig. 1D), sometimes with a fire-resistant basal burl or lignotuber (Fig. 2A). Their bark may be shedding, smooth to the ground or with rough bark persistent near the base, powdery to the touch, fibrous or hard, compacted, and rough to the smallest branches (Fig. 1E–I). Oil glands are usually present in the leaves (Fig. 2G, L, M) and sometimes present as a dark line or spots within the pith of smaller stems (Fig. 2C).

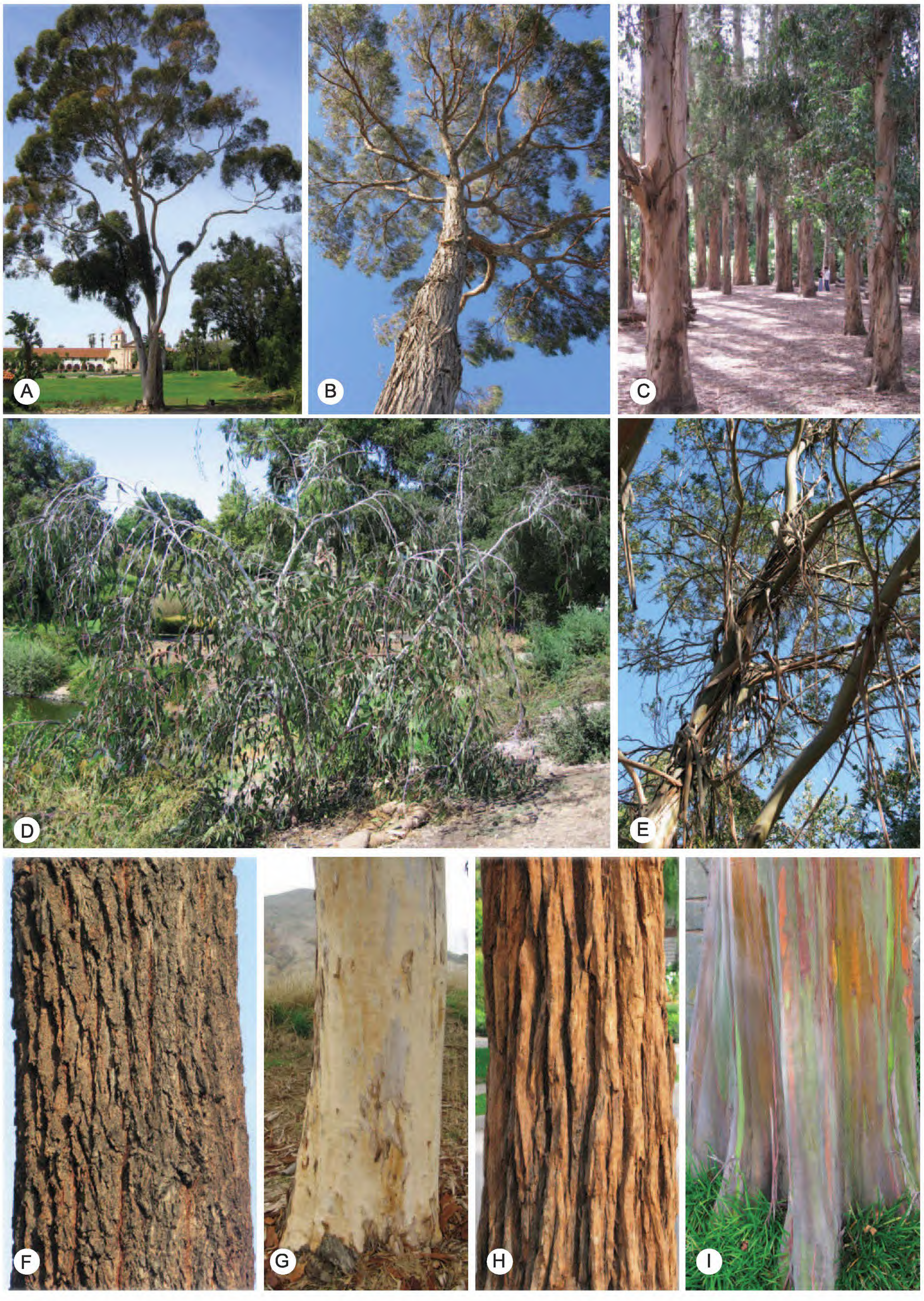


Figure 1. Growth forms and bark diversity in *Eucalyptus*. A–C, trees. —A. *Eucalyptus cladocalyx* F. Muell., showing typical tree form. —B. *Eucalyptus nicholii* Maiden & Blakely, with rough bark on trunk and small branches. —C. *Eucalyptus globulus* Labill., with smooth bark, sometimes with imperfectly shed rough bark on the basal area of trunk. —D. *Eucalyptus caesia* Benth., with multistemmed, shrubby mallee form. —E. *Eucalyptus parvula* L. A. S. Johnson & K. D. Hill, with bark shedding in long ribbons. —F. *Eucalyptus sideroxylon* A. Cunn. ex Woolls, showing typical ironbark trunk. —G. *Eucalyptus cladocalyx*, with bark shed in plates to the ground level. —H. *Eucalyptus robusta* Sm., showing rough, reddish brown bark. —I. *Eucalyptus deglupta* Blume, with smooth rainbow-colored bark to the ground level.

The leaves are of two different types in eucalypts. The juvenile leaves (leaves of seedlings, young plants, or new growth on mature plants after stems are cut or damaged) are generally attached oppositely, oriented horizontally, often sessile, heart-shaped or ovate to elliptical, clasping the stem, and glaucous (Fig. 2D). The adult leaves are generally attached alternately, hanging vertically, petiolate, linear to ovate, but most often lanceolate, and glossy or dull. Most often adult leaves are the same color on both sides, but many species have adult leaves that are discolorous and lighter on the underside (i.e., abaxially; Fig. 2F). Some species reproduce while the crown is in the juvenile leaf phase (Fig. 2E; see group 1 in the key for examples).

The inflorescences in eucalypts are unbranched umbels (sometimes condensed into heads) in leaf axils with three, seven, or more flowers (Fig. 2I), or highly branched, panicle-like clusters at branch tips (Fig. 2J) or in leaf axils, or rarely as solitary flowers in leaf axils. The peduncle can be round in cross-section (Fig. 3C) or flat and straplike (Fig 3F).

The outer floral organs (perianth) in eucalypts are sometimes fused into one or two opercula (bud caps), that are shed prior to or during flowering (Figs. 2N, 3A). A ring-shaped operculum scar on the developing bud is present when there are two opercula and the outer operculum is shed early in bud development (Fig. 2O, P). This operculum scar is absent when there is a single operculum or the outer operculum is held until near flowering (Fig. 3B). The operculum can be variously shaped, but most often it is beaked, conical, rounded, or horn-shaped (Fig. 3H). The stamens are numerous; in some species the outer stamens lack anthers (Fig. 3C, D); in others the stamens are in four clusters within the flower (Fig. 3G). The inferior ovary is sunken inside and fused with the hypanthium (Fig. 3E).

The fruit is a thick-walled, woody capsule that splits open at lines between three, four, or five valves at the top (Fig. 4). The hypanthium forms the hard outer layer; the pericarp is comparatively thin. After splitting open, the valves may be below the rim of the hypanthium (enclosed), exserted beyond the rim, or at the level of the rim (Fig. 4E). As the fruit develops, the hypanthium disk (the tissue between the ring where the stamens were attached and the top of the ovary) can be flat, ascending, or descending (Fig. 4F). Sometimes the valve tips remain fused across the fruit opening after dehiscence (Fig. 4C, H, *Eucalyptus cornuta* Labill. and *E. robusta* Sm., respectively). The fruit may be variously shaped at maturity (Fig. 4L). The seeds are generally 0.5 mm to 1.5 cm, cuboid or flattened, dark-brown or black, and surrounded by tan-colored, abundant chaff (unfertilized ovules) (Fig. 4K, *E. lansdowneana* F. Muell. & J. E. Br.).

Taxonomic Keys to Commonly and Widely Grown Eucalypts (*Angophora*, *Corymbia*, and *Eucalyptus*)

The following key to groups delineates the species treated here by easily recognized morphological characteristics. The nine species groupings are artificial, not based on any taxonomy or evolutionary relationships, and are used solely to make species identification easier. There is a description of the group and exemplar species for each group at the beginning of the key for each group. Several species appear in more than one group. *Eucalyptus* species occur in all group keys; *Angophora costata* is found in Key 3, and *Corymbia* species appear in Keys 3 and 4.

Key to Eucalypt Species Groups

1. Crown of mature reproductive tree made of mostly juvenile leaves; leaves mostly opposite, sessile, ovate, and glaucous ..... Group 1
1′. Crown of mature reproductive tree made of mostly adult leaves; leaves mostly alternate, sometimes opposite, clearly petiolate, lanceolate, and sometimes glaucous 2
2. Ironbarks, the bark rough, deeply furrowed, very hard (not easily pulled from tree), dark brown, gray, or black, retained on trunk and limbs ..... Group 2
2′. Not ironbarks, the bark smooth or rough, fibrous, shallowly furrowed, soft, brown to gray, retained on trunk and limbs or shedding in strips, plates, or sheets, leaving trunk smooth 3
3. Leaves discolorous, lighter on the underside (abaxial face) of leaves ..... Group 3
3′. Leaves concolorous, same color on both blade faces 4
4. Inflorescences compound, highly branched clusters at branch tips or in leaf axils ..... Group 4
4′. Inflorescences unbranched, single or paired umbels, or solitary flowers in leaf axils 5
5. Buds and fruits in clusters of 3 or solitary in leaf axils ..... Group 5
5′. Buds and fruits in clusters of more than 3 (usually 7 or more, some buds may be lost due to abortion or destruction) 6
6. Operculum scar absent from mature buds (buds have a single operculum with no circumferential scar on the bud surface caused by the shedding of the outer operculum, as happens in many other eucalypts); and buds and fruits usually in clusters of 11 or more; and disk of fruit level with rim, reddish brown, and shiny; and side leaf veins few, acutely angled, or parallel ..... Group 6

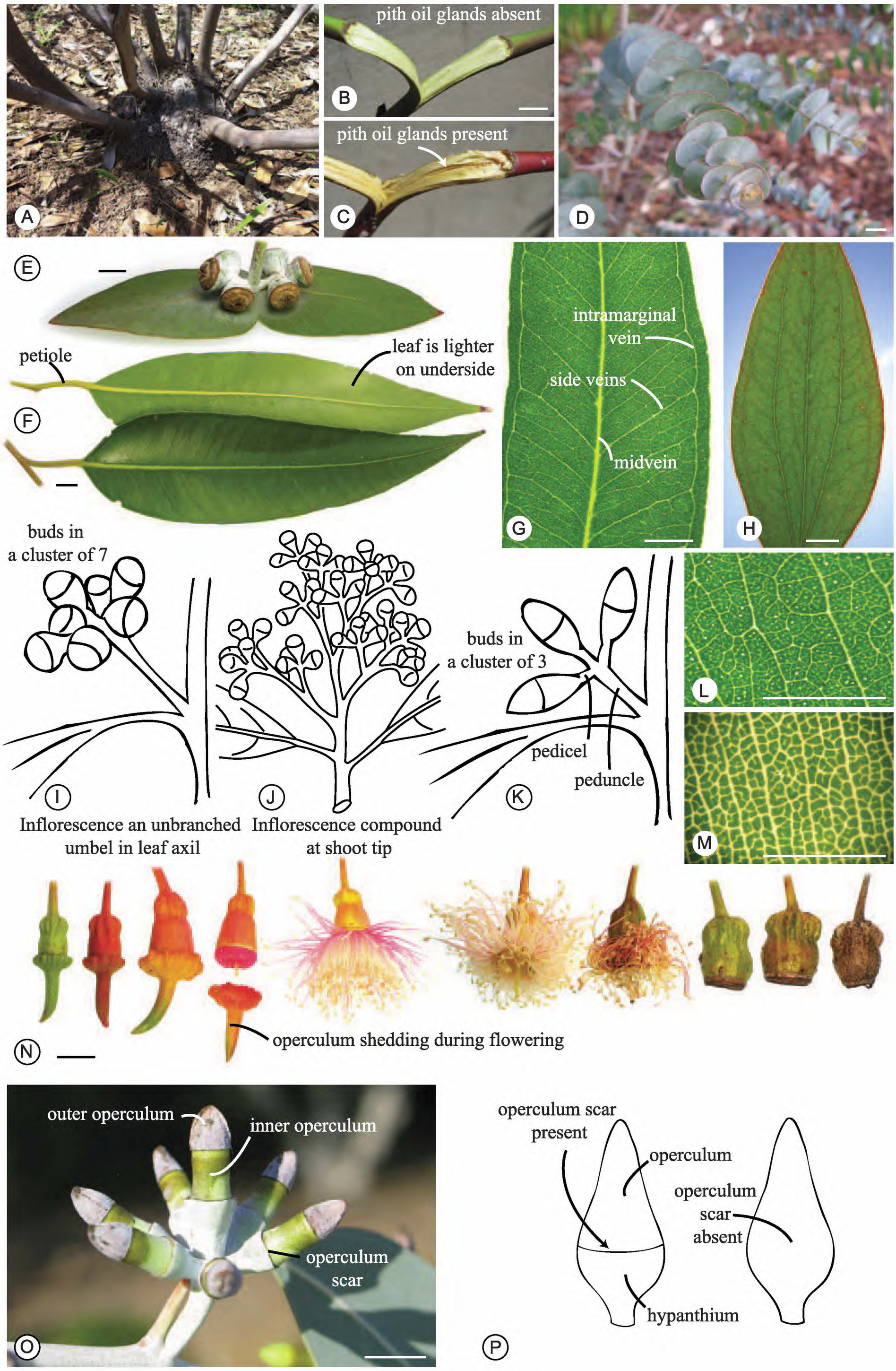


Figure 2. Lignotuber, pith, and leaf oil glands, as well as leaf and inflorescence characteristics in eucalypts. —A. Lignotuber of *Eucalyptus preissiana* Schauer. —B. Stem of *E. camaldulensis* Dehnh., without pith oil glands. —C. Stem of *E. torquata* Luehm., with pith oil glands. —D. Juvenile growth of *E. kruseana* F. Muell. —E. Opposite, sessile, juvenile leaves in the reproductive state, *E. cinerea* F. Muell. ex Benth. —F. Discolorous adult leaves in *E. robusta* Sm. —G. Typical eucalypt venation, with a midvein branching to side veins that converge near the leaf margin at the intramarginal vein, illustrated from *E. camaldulensis*. —H. Leaf venation, illustrating the prominently 3-veined characteristic, taken from *E. stellulata* Sieber ex DC.

6′. Operculum scar present on mature buds; buds and fruits in clusters of 7 or sometimes more; disk of fruit varying; side leaf veins varying 7
7. Peduncle broad, flattened, and straplike ..... Group 7
7′. Peduncle round or only slightly flattened in cross-section 8
8. Valves of mature fruit enclosed and sunken below fruit (hypanthium) rim or level with fruit rim ..... Group 8
8′. Valves of mature fruit clearly exserted beyond fruit rim ..... Group 9

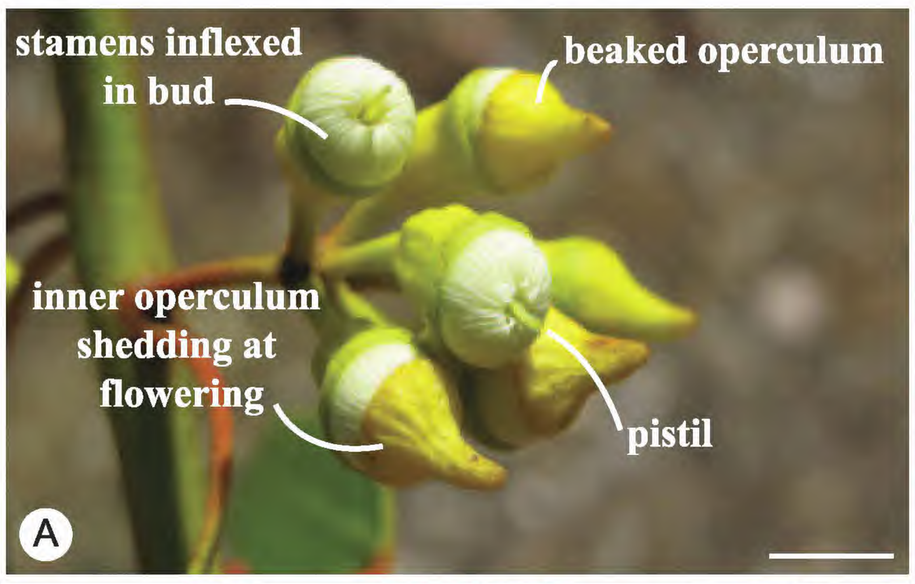
Group 1, Trees, Mallees, or Shrubs with a Crown of Mostly Juvenile Leaves

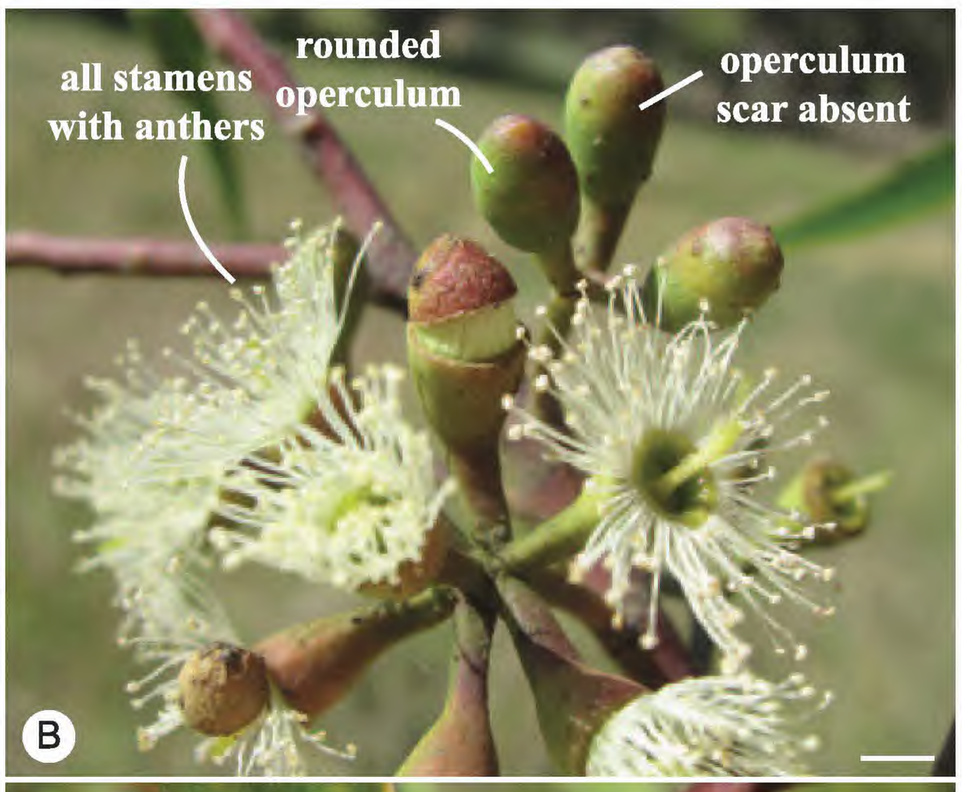
This group contains species in which the reproductively mature crown (branched, leafy canopy with flowers and fruits) is made primarily of leaves that are arrested in the juvenile leaf phase. The leaves are generally attached oppositely, oriented horizontally, often sessile, cordate or ovate, clasping the stem, and glaucous (Fig. 2D, E, *Eucalyptus kruseana* F. Muell. and *E. cinerea*, respectively). Mature growth forms are trees (*E. melanophloia* F. Muell.), mallees (*E. kruseana* F. Muell.), and shrubs (*E. macrocarpa* Hook.).

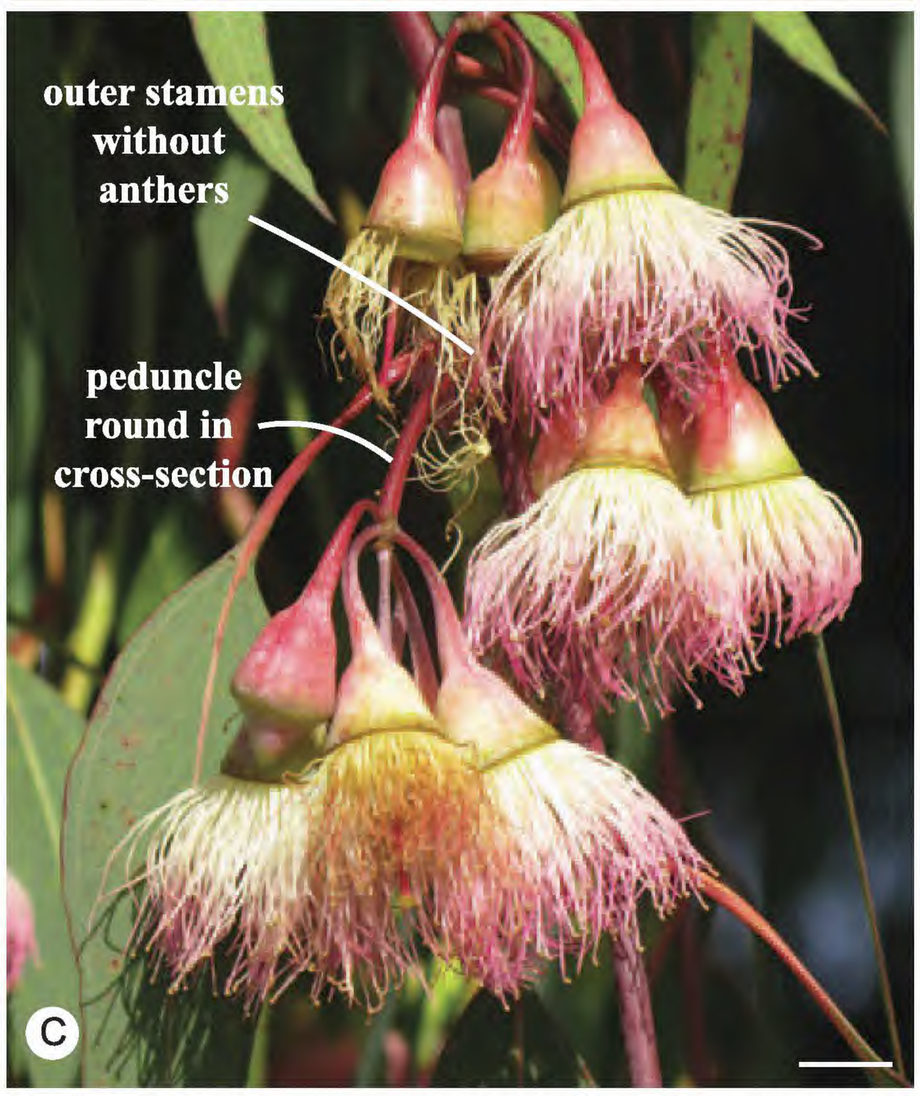
1. Most leaves fused at the base, forming a disk 2
2. Buds and fruits in clusters of 3 ..... *Eucalyptus perriniana* (spinning gum)
2′. Buds and fruits in clusters of 7 or more ..... *E. risdonii* (Risdon peppermint)
1′. All leaves free (not fused) 3
3. Ironbark, the bark rough, deeply furrowed, very hard (not easily pulled from tree), dark brown, gray, or black, retained on trunk and limbs ..... *E. melanophloia* (silver-leaved ironbark)
3′. Not ironbarks, the bark smooth or rough, fibrous, shallowly furrowed, soft, brown to gray, retained on trunk and limbs or shedding in strips, plates, or sheets, leaving trunk smooth 4
4. Mallees or multistemmed shrubs 5
5. Stems square in cross-section 6
6. Leaves sessile, inflorescences compound, at branch tips (terminal) ..... *E. pruinosa* (silver box, silverleaf box)
6′. Leaves petiolate and sessile, inflorescences unbranched umbels, in leaf axils 7
7. Buds pedicellate, in clusters of 3 ..... *E. pleurocarpa* (tallerack)
7′. Buds sessile, in clusters of 7 or more ..... *E. neglecta* (Omeo gum)
5′. Stems round in cross-section 8
8. Buds and fruits in clusters of more than 3 9
9. Leaves crowded on stem; flowers greenish yellow; fruit < 0.75 cm wide; valves at rim level ..... *E. kruseana* (bookleaf mallee)
9′. Leaves not crowded on stem; flowers pale yellow or whitish; fruit > 1 cm wide; valves exserted ..... *E. crucis* (Southern Cross silver mallee)
8′. Buds and fruits in clusters of 3 or solitary in leaf axils 10
10. Buds and fruits solitary in leaf axils 11
11. Buds and fruits pedicellate on downturned peduncles .... *E. rhodantha* (rose mallee)
11′. Buds and fruits sessile on erect, stout peduncles ..... *E. macrocarpa* (mottlecah)
10′. Buds and fruits in clusters of 3 12
12. Buds and fruits sessile; flowers white; fruit < 1.5 cm wide ..... *E. pulverulenta* (silver-leaved mountain gum)
12′. Buds and fruits pedicellate; flowers pink or red or pale yellow; fruit > 2 cm wide ..... *E. pyriformis* (Dowerin rose)
4′. Trees 13
13. Bark smooth, shedding, sometimes with imperfectly shed rough bark on basal area of trunk 14
14. Inflorescence pendulous, fruit urn-shaped ..... *E. urnigera* (urn gum)
14′. Inflorescence erect, fruit barrel- or cup-shaped 15
15. Some leaf margins crenulate; fruit 1 cm wide, sessile ... *E. cordata* (heart-leaved silver gum)
15′. All leaf margins entire; fruit < 1 cm wide, very shortly pedicellate .... *E. gunnii* (cider gum)
13′. Bark rough, furrowed, retained on trunk and limbs 16
16. Buds and fruits in clusters of 3 ..... *E. cinerea* (mealy stringybark, Argyle apple)
16′. Buds and fruits in clusters of more than 3 17
17. Leaf margins crenulate ..... *E. crenulata* (Buxton gum)
17′. Leaf margins entire 18

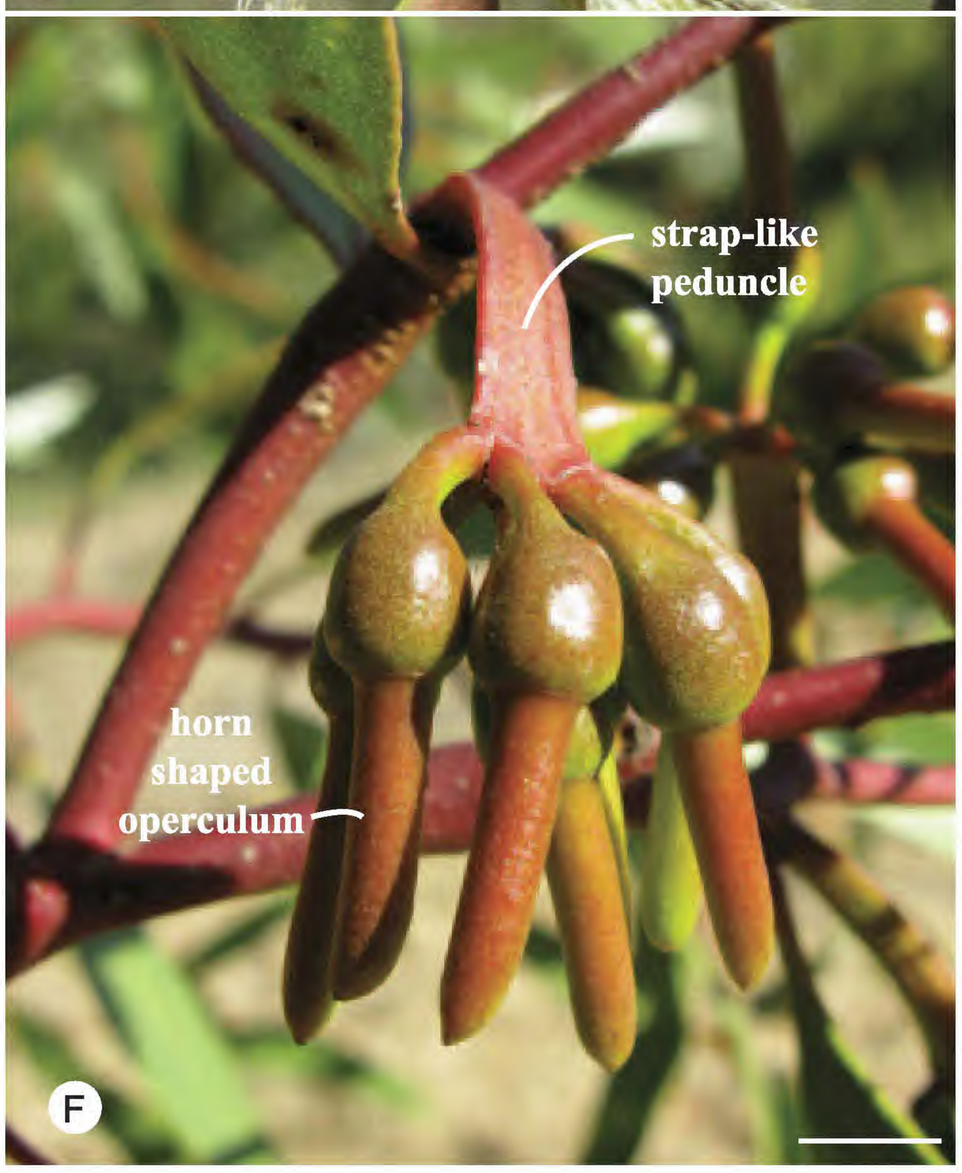
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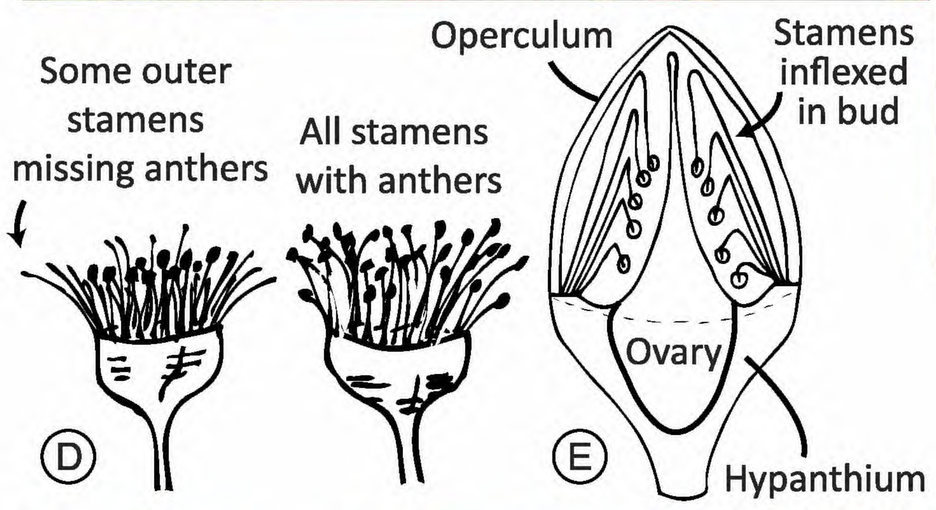
I–K. Inflorescence characteristics. —L. Typical leaf with oil glands, taken from *E. camaldulensis*. —M. Leaf lacking oil glands, taken from *Corymbia ficifolia* (F. Muell.) K. D. Hill & L. A. S. Johnson. —N. Developmental series of flowering and fruit formation in *E. torquata*. —O. Flower bud characteristics, taken from *E. prava* L. A. S. Johnson & K. D. Hill. —P. Flower bud and operculum terminology. A–O scale bars = 1 cm.

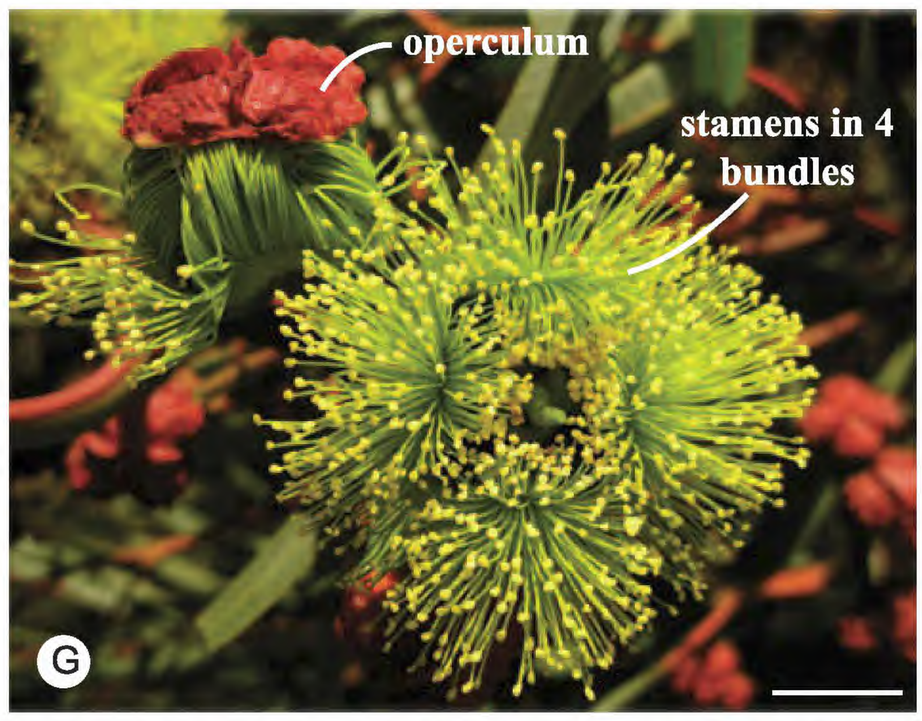












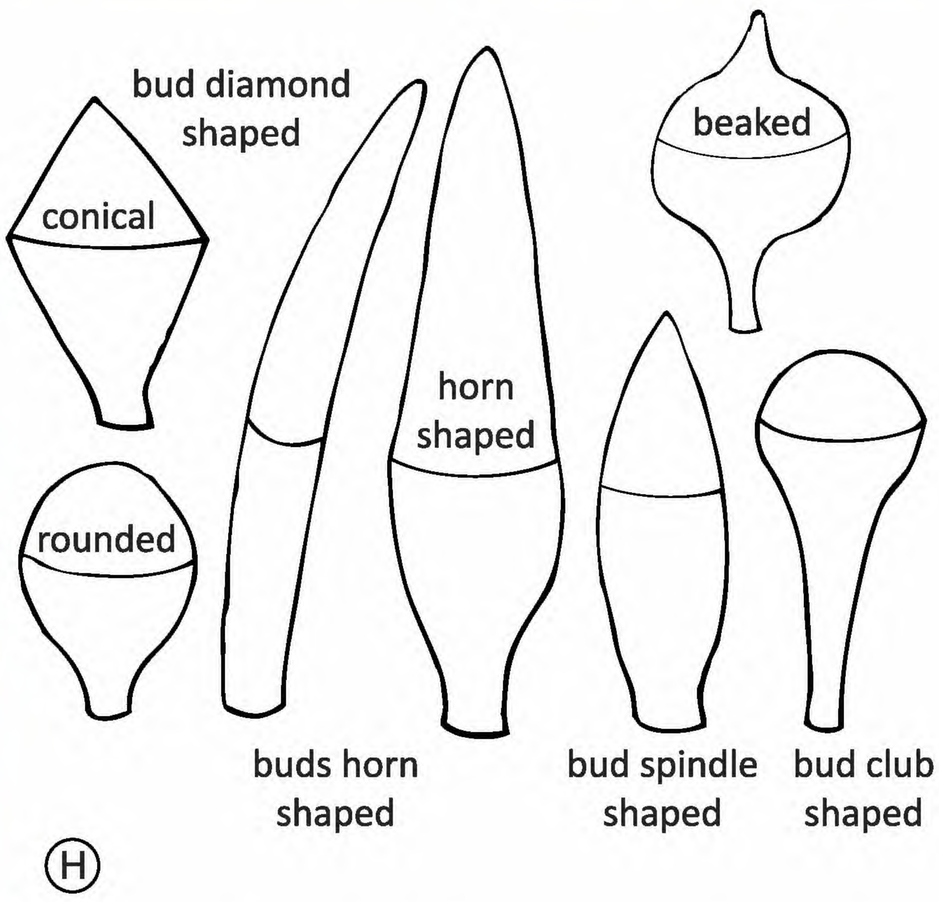


Figure 3. Inflorescence and flower characteristics in *Eucalyptus*. —A. Flower bud characteristics, showing the beaked operculum and stamens that are all bent inward under the operculum, taken from *E. incrassata* Labill. —B. Flower bud characteristics, illustrating the lack of an operculum scar, a rounded operculum, and stamens that are all fertile, taken from *E. diversicolor* F. Muell. —C. *Eucalyptus sideroxylon* A. Cunn. ex Woolls, showing umbels with a peduncle that is round in cross-section and flowers with outer stamens without anthers. —D, E. Stamen and floral bud characteristics. —F. *Eucalyptus eremophila* (Diels) Maiden, with the umbel showing a straplike peduncle and the flowers with horn-shaped opercula. —G. *Eucalyptus erythrocorys* F. Muell., with the flowers illustrating the bright red opercula and yellow stamens bundled in four groups within the flower. —H. Flower bud and operculum shapes. A–G scale bars = 1 cm.

18. Buds and fruits in clusters of 7 to 15, oval, sessile ..... *E. neglecta* (Omeo gum)
18′. Buds and fruits in clusters of 7, diamond-shaped, sessile or very shortly pedicellate ..... *E. conspicua* (Gippsland swamp-box)

Group 2, Ironbarks, Trees with Very Hard, Dark Bark

This group contains species called ironbarks in which the bark is impregnated with hardened kino (a dark gummy exudate), making the bark rough, thick, deeply furrowed, very hard (not easily pulled from tree), dark brown, gray, or black, and retained on trunk and limbs (Fig. 1F, *Eucalyptus sideroxylon* L. A. S. Johnson & K. D. Hill). These species primarily occur in eastern and northeastern Australia and are exemplified by *E. crebra* Labill. and *E. paniculata* Sm.

1. Leaves always opposite, glaucous on mature trees ..... *Eucalyptus melanophloia* (silver-leaved ironbark)
1′. Leaves mostly alternate, not glaucous on mature trees 2
2. Outer stamens without anthers 3
3. Adult leaves discolorous ..... *E. paniculata* (gray ironbark)
3′. Adult leaves concolorous 4
4. Buds and fruits in clusters of 7; leaves dull ..... *E. sideroxylon* (red ironbark)
4′. Buds and fruits in clusters of more than 7; leaves glossy ..... *E. sieberi* (silvertop ash)
2′. All stamens with anthers 5
5. Inflorescences unbranched umbels in leaf axils (not true ironbarks, but may be mistaken as such) ..... *E. bridgesiana* (apple box)
5′. Inflorescences compound (highly branched) clusters at branch tips 6
6. Operculum rounded; fruit valves enclosed ..... *E. crebra* (narrow-leaved ironbark)
6′. Operculum conical; fruit valves exserted 7
7. Operculum 1.5× hypanthium length; valves of mature fruit clearly exserted; fruit up to 1 cm wide ..... *E. fibrosa* (broad-leaved ironbark)
7′. Operculum equal to hypanthium; valves of mature fruit only slightly exserted or at rim level; fruit 0.5–0.7 cm wide ..... *E. siderophloia* (ironbark)

Group 3, Trees or Mallees with Discolorous Leaves

This group contains species with discolorous leaves (Fig. 2F, *Eucalyptus robusta*). The upper (adaxial) and lower (abaxial) surfaces of mature leaves are of different colors. The upper surface of the leaf is usually darker green than the lower surface. Examples of species with discolorous leaves are *Corymbia ficifolia* F. Muell. and *E. cladocalyx* F. Muell.

1. Adult leaves opposite; bark pink or orange, smooth to the ground; operculum absent ..... *Angophora costata* (apple gum)
1′. Adult leaves alternate; bark varying; operculum present 2
2. Mallee; sepals small, pointed, usually apparent on the buds and fruits ... *Eucalyptus curtisii* (Plunkett mallee)
2′. Tree; sepals fused into an operculum or sepals not apparent 3
3. Bark smooth and shedding completely, or bark rough on the trunk and shedding from the largest limbs and branches 4
4. Inflorescences compound, highly branched clusters at branch tips or in leaf axils 5
5. Bark multicolored, with orange and light green patches; fruit < 0.5 cm wide ..... *E. deglupta* (rainbow gum, Mindanao gum)
5′. Bark slaty green, dark green, or gray; fruit > 0.75 cm wide ..... *Corymbia torelliana* (blood-leaf gum, cadaghi)
4′. Inflorescences unbranched umbels in leaf axils 6
6. Valves of mature fruit clearly enclosed within fruit rim 7
7. Leaves highly shiny, leaf oil glands small, obscure; buds and fruits born on leafless sections of branchlets; operculum scar obvious; mature leaves often sickle-shaped; dried fruit with longitudinal ridges ..... *E. cladocalyx* (sugar gum)
7′. Leaves dull, leaf oil glands obvious; buds and fruits born in leaf axils; operculum scar obscure or absent; mature leaves lanceolate; dried fruit not ridged ... *E. diversicolor* (karri)
6′. Valves of mature fruit exserted beyond fruit rim or level with fruit rim 8
8. Valves of mature fruit at rim level or only slightly exserted 9
9. Bark shedding, mostly or completely smooth to the ground, occasionally with a short stocking of rough bark at the base ..... *E. deanei* (mountain blue gum)
9′. Bark retained on lower trunk, mostly rough and fibrous, smooth on upper branches ..... *E. urophylla* (Timor mountain gum)
8′. Valves of mature fruit strongly exserted 10
10. Bark gray, mottled, shed in patches, exposing orange, coppery new bark, usually smooth to the ground ..... *E. punctata* (gray gum)

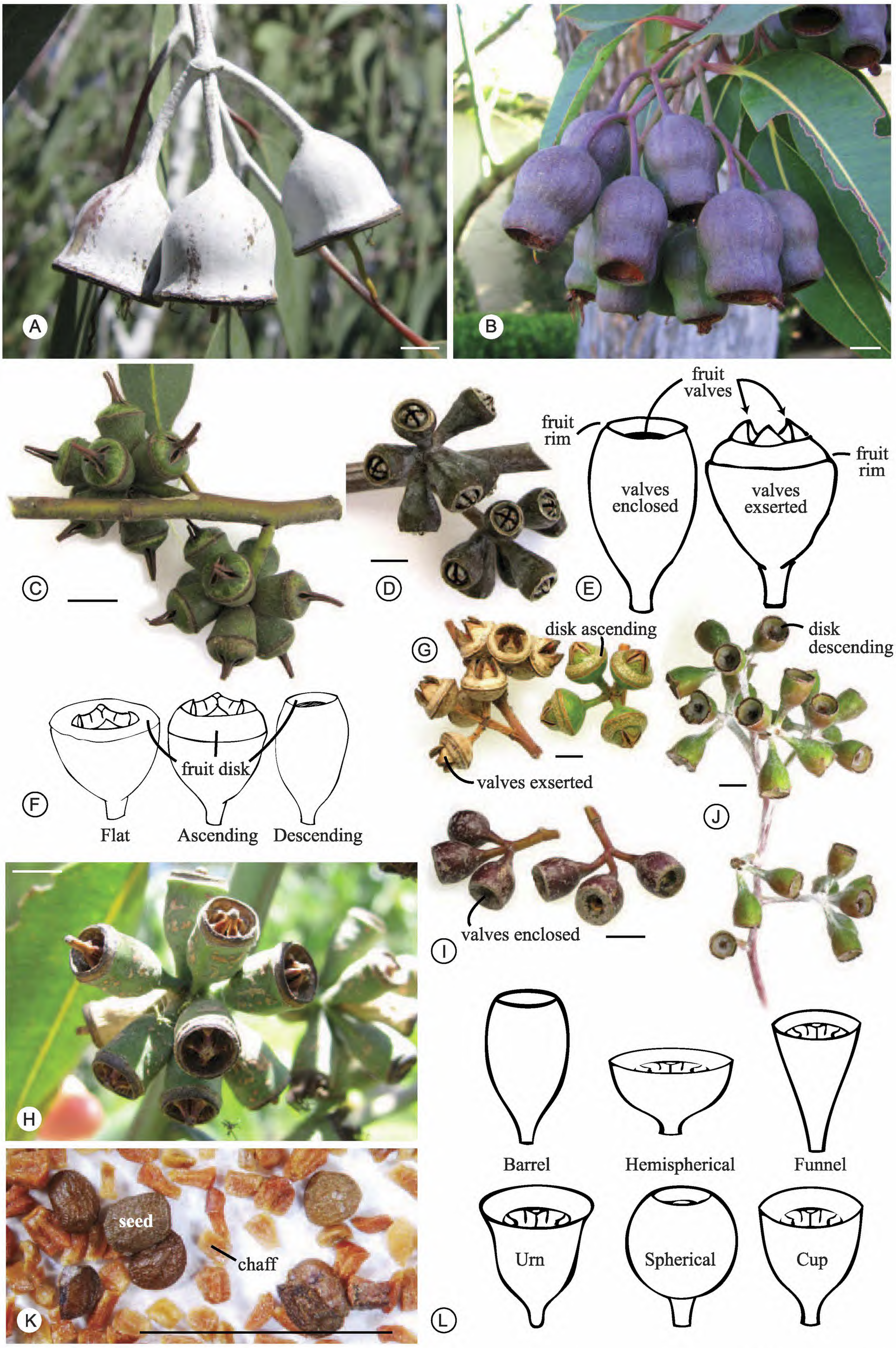


Figure 4. Fruit and seed diversity in eucalypts. —A. *Eucalyptus caesia* subsp. *magna* Brooker & Hopper, illustrating a 3-fruited cluster. —B. *Corymbia calophylla* (Lindl.) K. D. Hill & L. A. S. Johnson, with urn-shaped fruit. —C. *Eucalyptus cornuta* Labill., showing the exserted valve tips that are connected in mature fruit. —D. *Eucalyptus grandis* W. Hill, with mature fruits, each of which reveal four exserted and inward curved valves. —E. Fruit valve characteristics. —F. Fruit disk characteristics. —G. *Eucalyptus camaldulensis* Dehnh., with fruit having exserted valves and ascending disks. —H. *Eucalyptus robusta* Sm., with fruit valve tips connected in mature fruit, these valves persisting even after seeds are shed. —I. *Eucalyptus leucoxylon*

10′. Bark smooth and cream-colored, or pale gray, or white, sometimes fibrous and flaky at the base (to ca. 2 m above ground) or rough for most of the trunk and smooth on the branches 11
11. Valves of mature fruit 4 or 5, curved inward; buds often glaucous ..... *E. grandis* (rose gum)
11′. Valves of mature fruit usually 4, erect; buds not glaucous ..... *E. saligna* (Sydney blue gum)
3′. Bark rough, furrowed, retained on trunk and large limbs 12
12. Inflorescences as highly branched clusters at branch tips or in leaf axils 13
13. Valves of mature fruit level with fruit rim or exserted beyond fruit rim 14
14. Inflorescences compound, in leaf axils; all stamens with anthers; stamens not clustered ..... *E. cloeziana* (gympie messmate)
14′. Inflorescences at branch tips, outer stamens without anthers; stamens in 4 clusters ..... *E. microcorys* (tallowwood)
13′. Valves of mature fruit deeply enclosed 15
15. Fruit prominently ridged; buds scaly ..... *C. ptychocarpa* (swamp bloodwood)
15′. Fruit smooth; buds not scaly 16
16. Fruit < 1.5 cm wide ..... *C. gummifera* (red bloodwood)
16′. Fruit > 2 cm wide 17
17. Flowers pale orange to deep pink and red; seeds with a wing; leaf oil glands lacking or very sparse ..... *C. ficifolia* (red-flowering gum)
17′. Flowers white; seeds wingless; leaf oil glands numerous ... *C. calophylla* (marri)
12′. Inflorescences as unbranched umbels in leaf axils 18
18. Valves of the mature fruit fused across the fruit opening; fruit cylindrical to barrel-shaped ..... *E. robusta* (swamp mahogany)
18′. Valves of mature fruit free, not connected at the tips; fruit variously shaped 19
19. Valves of mature fruit clearly exserted beyond fruit rim 20
20. Fruit > 1.4 cm wide; fruit disk flat ..... *E. pellita* (large-fruited red mahogany)
20′. Fruit 1 cm or less wide; fruit disk ascending ..... *E. resinifera* (red mahogany)
19′. Valves of mature fruit enclosed, level with fruit rim, or slightly exserted 21
21. Buds and fruits glaucous; flowers bright orange ..... *E. miniata* (Darwin woollybutt)
21′. Buds and fruits green or brown; flowers white 22
22. Peduncles broad, flattened; buds and fruits sessile or nearly so; operculum scar present ..... *E. botryoides* (southern mahogany)
22′. Peduncles slender, round in cross-section; buds and fruits pedicellate; operculum scar absent 23
23. Leaves only slightly lighter on the underside 24
24. Leaves thin; operculum conical to beaked ..... *E. eugenioides* (thin-leaved stringybark)
24′. Leaves thicker, leathery; operculum rounded ..... *E. muelleriana* (yellow stringybark)
23′. Leaves distinctly lighter on the underside, leathery 25
25. Fruit > 1 cm wide; outer stamens erect under operculum when in bud ..... *E. marginata* (jarrah)
25′. Fruit 0.5–1 cm wide; outer stamens bent under operculum when in bud ..... *E. acmenoides* (white mahogany)

Group 4, Trees or Mallees with Compound, Highly Branched Inflorescences

This group contains species in which the flowers are formed in compound, panicle-like, highly branched clusters at branch tips (e.g., *Eucalyptus polyanthemos* Schauer) or in leaf axils (e.g., *Corymbia citriodora* (Hook.) K. D. Hill & L. A. S. Johnson) (cf. diagram, Fig. 2J).

1. Bark shedding, smooth to the ground 2
2. Outer stamens without anthers; inflorescences at branch tips (terminal) ..... *Eucalyptus polyanthemos* (red box, silver dollar gum)
2′. All stamens with anthers; inflorescences in leaf axils 3
3. Leaves lemon-scented when crushed ..... *Corymbia citriodora* (lemon-scented gum)
3′. Leaves with medicinal or spicy scent when crushed (but not like lemon) 4

←

F. Muell., with cup-shaped fruit that have enclosed valves, and fruit in clusters of three. —J. *Eucalyptus polyanthemos* Schauer, with fruit that have descending disks. —K. *Eucalyptus lansdowneana* F. Muell. & J. E. Br., seeds and chaff. —L. Diversity of fruit shapes. A–L scale bars = 1 cm.

4. Trunk uniformly smooth, not mottled, powdery to the touch; fruit thin-walled ..... *C. aparrerinja* (ghost gum)
4′. Trunk mottled, not powdery; fruit thick-walled ..... *C. maculata* (spotted gum)
1′. Bark rough, furrowed, retained on trunk and largest limbs (small branches may be smooth) 5
5. Mallee or multistemmed shrub; operculum scar absent 6
6. Flowers red to mauve to pink ..... *E. lansdowneana* (red-flowered mallee box)
6′. Flowers white, pink, or purple ..... *E. albopurpurea* (purple-flowered mallee)
5′. Tree; operculum scar present or absent 7
7. Bark yellowish or tan, flaky; leaves sickle-shaped; fruit barrel-shaped or urn-shaped; valves enclosed ..... *C. eximia* (yellow bloodwood)
7′. Bark gray, short-fibered, hard (box-type); most leaves lanceolate or ovate to elliptical; fruit variously shaped; valves enclosed or exserted 8
8. Valves of mature fruit clearly exserted beyond fruit rim ..... *E. coolabah* (coolibah)
8′. Valves of mature fruit enclosed or level with fruit 9
9. Operculum scar absent 10
10. Buds and fruits glaucous ..... *E. albens* (white box)
10′. Buds and fruits green or brown (not waxy) 11
11. Outer stamens without anthers; buds curved ..... *E. ochrophloia* (napunyah)
11′. All stamens with anthers; buds straight ..... *E. microcarpa* (inland box)
9′. Operculum scar present 12
12. Outer stamens without anthers; stamens shed together in a ring 13
13. Mature leaves glossy green ..... *E. baueriana* (round-leaved box)
13′. Mature leaves dull, gray-green, bluish green, or glaucous ..... *E. polyanthemos* (red box, silver dollar gum)
12′. All stamens with anthers; stamens shed individually 14
14. Bark of small branches rough 15
15. Leaves ovate to elliptical ..... *E. populnea* (Bimbil box)
15′. Leaves lanceolate ..... *E. largiflorens* (black box)
14′. Bark of small branches smooth, rough bark extending only to base of larger branches 16
16. Valves of mature fruit at rim level and sometimes slightly exserted; leaf oil glands obvious; intramarginal vein present ..... *E. microtheca* (tropical coolibah)
16′. Valves of mature fruit enclosed; leaf oil glands obscure or absent; intramarginal vein obscure or absent ..... *E. intertexta* (gum coolibah)

Group 5, Trees or Mallees with Buds and Fruits Solitary or in Clusters of Three in Leaf Axils

This group contains species in which the flowers are formed in clusters of three on a single stalk in the leaf axils (e.g., *Eucalyptus viminalis* Labill. and *E. cosmophylla* F. Muell.) or are formed solitarily in leaf axils (e.g., *E. globulus* Labill.) (cf. diagram, Fig. 2K).

1. Buds and fruits solitary 2
2. Buds and fruits glaucous; large tree ..... *Eucalyptus globulus* (blue gum, Tasmanian blue gum)
2′. Buds and fruits green, yellow, red, or brown (not waxy); small tree, mallee, or shrub 3
3. Buds round in cross-section, pear-shaped with many ribs ..... *E. stoatei* (scarlet pear gum)
3′. Buds square in cross-section, with 4 wings 4
4. Buds and fruits sessile, stiffly downturned; leaves thick; fruit > 2.5 cm wide ..... *E. tetraptera* (square-fruited mallee)
4′. Buds and fruits pedicellate, pendulous; leaves thin; fruit < 2.5 cm wide 5
5. Operculum slender and beaked ..... *E. dolichorhyncha* (fuchsia gum)
5′. Operculum flat and disklike ..... *E. forrestiana* (fuchsia gum)
1′. Buds and fruits in clusters of 3 6
6. Mallees or multistemmed shrubs 7
7. Operculum bright red; stamens in 4 clusters; adult leaves opposite or nearly so ..... *E. erythrocorys* (redcap gum, Illyarrie)
7′. Operculum red, brown, green, or glaucous; stamens not clustered; adult leaves alternate 8
8. Operculum smooth 9
9. Buds and fruits glaucous ..... *E. caesia* subsp. *magna* (silver princess)
9′. Buds and fruits green or brown (not waxy) 10
10. Valves of mature fruit strongly exserted; bark rough ..... *E. morrisii* (gray mallee)
10′. Valves of mature fruit only slightly exserted or level with fruit rim; bark smooth 11
11. Leaves < 4 cm long ..... *E. vernicosa* (varnished gum)
11′. Leaves > 6 cm long 12
12. Operculum rounded and flattened; fruit bell-shaped ..... *E. preissiana* (bell-fruited mallee)

12′. Operculum beaked or conical; fruit cup-shaped, cylindrical, or funnel-shaped 13
13. Flowers red to pale yellow; fruit funnel-shaped ..... *E. erythronema* (red-flowered mallee)
13′. Flowers white; fruit cup-shaped or cylindrical ... *E. cosmophylla* (cup gum)
8′. Operculum distinctly ribbed or warty 14
14. Operculum warty, scar absent 15
15. Valves enclosed; bark smooth ..... *E. coccifera* (Tasmanian snow gum)
15′. Valves exserted; bark rough ..... *E. serraensis* (Grampians stringybark)
14′. Operculum ribbed, scar present 16
16. Buds and fruits sessile or nearly so 17
17. Leaves glossy green; fruit cylindrical, < 2.5 cm wide ..... *E. angulosa* (ridge-fruited mallee)
17′. Leaves dull, green to blue-green; fruit disk-shaped, > 3 cm wide ..... *E. youngiana* (large-fruited mallee)
16′. Buds and fruits clearly pedicellate (pedicels as long as or longer than hypanthium) ... 18
18. Peduncles stout; fruit with 4 or 5 prominent ridges; bark usually smooth to the ground ..... *E. pyriformis* (Dowerin rose)
18′. Peduncles slender; fruit with > 5 prominent ridges; bark usually rough at the base ..... *E. kingsmillii* (Kingsmill's mallee)
6′. Trees 19
19. Bark rough, furrowed, retained on trunk and limbs ..... *E. longifolia* (woollybutt)
19′. Bark smooth, shedding (sometimes with imperfectly shed rough bark on the basal area of trunk) 20
20. Outer stamens without anthers; flowers red, pink, yellow, orange or white ..... *E. leucoxylon* (white ironbark)
20′. All stamens with anthers; flowers white 21
21. Buds and fruits distinctly square in cross-section ..... *E. steedmanii* (Steedman's mallet)
21′. Buds and fruits round in cross-section or only slightly angled 22
22. Operculum warty and with a central knob; peduncle stout or absent 23
23. Peduncles absent ..... *E. bicostata* (Victorian blue gum)
23′. Peduncles present ..... *E. pseudoglobulus* (Victorian eurabbie)
22′. Operculum smooth or warty, but without a central knob (a beak may be present); peduncle slender 24
24. Valves of mature fruit exserted; fruit disk raised 25
25. Buds and fruits glaucous ..... *E. rubida* (blackbutt candlebark)
25′. Buds and fruits green or brown (not waxy) 26
26. Juvenile leaves lanceolate, glossy, green ..... *E. viminalis* (manna gum, ribbon gum)
26′. Juvenile leaves ovate to elliptical, dull, blue-green ..... *E. dalrympleana* (broad-leaved ribbon gum)
24′. Valves of mature fruit enclosed or level with fruit rim; fruit disk descending or flat .. 27
27. Buds and fruits sessile or pedicels 0.2 cm or less 28
28. Juvenile leaves fused into a single disk; fruit 0.5–0.8 cm wide ..... *E. perriniana* (spinning gum)
28′. Juvenile leaves not fused; fruit 0.8–1.2 cm wide ..... *E. glaucescens* (Tingiringi gum)
27′. Buds and fruits pedicellate 29
29. Peduncles as long as or longer than buds, often downturned; fruit urn-shaped ..... *E. urnigera* (urn gum)
29′. Peduncles shorter than buds, erect; fruit hemispherical, barrel- or slightly urn-shaped 30
30. Leaves glossy with a hooked tip; operculum scar absent; buds warty ..... *E. coccifera* (Tasmanian snow gum)
30′. Leaves dull, gray-green or bluish green, with a pointed tip; operculum scar present; buds smooth ..... *E. gunnii* (cider gum)

Group 6, Trees without an Operculum Scar but with Acutely Angled or Parallel Leaf Veins, and Buds and Fruits in Clusters of More than Seven

This group contains species in which the mature flower buds do not have an operculum scar. Such buds have a single operculum with no circumferential scar on the bud surface caused by the shedding of the outer operculum, as happens in many other eucalypts (cf. Fig. 2P). In this group the buds and fruits are usually in clusters of 11 or more, the disk of the fruit is reddish brown, shiny, and level with the fruit rim (cf. diagrams in Fig. 4E, F). Species in this group also make leaves in which the side leaf veins are few, acutely angled, or parallel (Fig. 2H, *Eucalyptus stellulata* Sieber ex DC.). Exemplar species in the group are *E. pauciflora* Sieber ex Spreng. and *E.*

amygdalina Labill. Taxa in group 6 include the widely grown and naturalized members of *Eucalyptus* subg. *Eucalyptus*, but this is only a partial treatment of this subgenus, which contains approximately 120 taxa.

1. Buds and fruits in clusters of 7 2
   2. Buds green, pedicellate; outer stamens without anthers ..... *Eucalyptus melliodora* (honey box)
   2′. Buds glaucous, sessile; all stamens with anthers ..... *E. albens* (white box)
1′. Buds and fruits in clusters of more than 7 3
   3. Inflorescences usually paired umbels in leaf axils 4
      4. Bark rough, fibrous, retained on both the trunk and limbs ..... *E. fastigata* (brown barrel)
      4′. Bark rough on the lower trunk only; large limbs smooth ..... *E. regnans* (mountain ash)
   3′. Inflorescences always single umbels in leaf axils 5
      5. Leaves with side veins nearly parallel or prominently 3-veined 6
         6. Leaf side veins nearly parallel; buds club-shaped, rounded, sometimes warty ..... *E. pauciflora* (snow gum)
         6′. Leaves prominently 3-veined; buds spindle-shaped, pointed, smooth ..... *E. stellulata* (black sally)
      5′. Leaves with side veins angling toward leaf margin, not parallel-veined or 3-veined 7
         7. Bark rough, fibrous, retained on the entire trunk and large limbs, extending to the small branches ... 8
            8. Outer stamens without anthers ..... *E. sieberi* (silvertop ash)
            8′. All stamens with anthers 9
               9. Most leaves 0.4–1 cm wide ..... *E. amygdalina* (black peppermint)
               9′. Most leaves > 1 cm wide 10
                  10. Adult leaf bases clearly oblique; juvenile leaves pendulous, usually > 6 cm wide, glossy green, petiolate ..... *E. obliqua* (messmate stringybark)
                  10′. Adult leaf bases tapering evenly or almost evenly to the petiole, or occasionally oblique; juvenile leaves upright, usually < 5 cm wide, glaucous or green, sessile or petiolate 11
                     11. Juvenile leaves opposite, sessile; adult leaves always concolorous 12
                        12. Juvenile leaves ovate, gray-green to glaucous ... *E. dives* (blue peppermint)
                        12′. Juvenile leaves narrowly lanceolate or linear, green ..... *E. radiata* (narrow-leaved peppermint)
                     11′. Juvenile leaves alternate, petiolate; adult leaves slightly discolorous or concolorous 13
                        13. Leaves thin; operculum conical to beaked ..... *E. eugenioides* (thin-leaved stringybark)
                        13′. Leaves thicker, leathery; operculum rounded ..... *E. muelleriana* (yellow stringybark)
         7′. Bark smooth, shedding completely, or rough on lower trunk only, with smooth upper trunk and/or large limbs 14
            14. Bark rough on lower trunk only with smooth upper trunk or large limbs 15
               15. Fruit sessile or pedicel < 0.4 cm long ..... *E. olsenii* (Olsen's gum, Woila gum)
               15′. Fruit clearly pedicellate 16
                  16. Peduncles flattened ..... *E. pilularis* (blackbutt)
                  16′. Peduncles round in cross-section or slightly angular 17
                     17. Bark finely fibrous, gray or brown; fruit barrel-shaped; buds often glaucous ..... *E. delegatensis* (alpine ash)
                     17′. Bark furrowed, compact, brown-black; fruit cup-shaped; buds green ..... *E. elata* (river peppermint)
            14′. Bark completely smooth, shedding to the ground 18
               18. Young branches, buds, and fruits warty and glaucous ... *E. coccifera* (Tasmanian snow gum)
               18′. Young branches, buds, and fruits smooth, green or brown 19
                  19. Leaves linear or narrowly lanceolate, smelling of peppermint when crushed ... *E. pulchella* (white peppermint)
                  19′. Leaves lanceolate, without peppermint smell 20
                     20. Fruit 0.9 × 0.9 cm ..... *E. haemastoma* (scribbly gum)
                     20′. Fruit up to 0.6 × 0.7 cm ..... *E. racemosa* (scribbly gum)

Group 7, Trees, Mallees, and Shrubs with Flattened Straplike Peduncles

This group contains species in which the peduncle (the common stalk of the cluster of flowers) is broad, flattened, and straplike (Fig. 3F, *Eucalyptus eremophila* (Diels) Maiden) as opposed to being round in cross-section (Fig. 2C, *E. torquata*). Exemplar species in group 7 are *E. gomphocephala* A. Cunn. ex DC. and *E. utilis* Brooker & Hopper.

1. Valves of mature fruit clearly exserted beyond fruit rim 2
   2. Buds glaucous; operculum warty and with a central knob ..... *Eucalyptus maidenii* (Maiden's gum)

2′. Buds green, yellow, or brown; operculum without a central knob 3
3. Valve tips connected in mature fruit (after seed is shed) 4
4. Branchlet pith glandular ..... *E. cornuta* (yate)
4′. Branchlet pith without oil glands 5
5. Buds and fruits fused at the base 6
6. Apical bud at shoot tip 1–2.2 cm long, feeling triangular when rolled between finger and thumb; peduncle thick, 2–4 cm long; lacking a lignotuber ..... *E. conferruminata* (Bald Island marlock)
6′. Apical bud at shoot tip < 1 cm long, not triangular; peduncle thin; forming a lignotuber ..... *E. lehmannii* (bushy yate)
5′. Buds and fruits not fused at the base 7
7. Operculum smooth or only slightly warty; forming a lignotuber ... *E. talyuberlup* (pretty yate)
7′. Operculum very warty; lacking a lignotuber ..... *E. megacornuta* (warted yate)
3′. Valve tips free in mature fruit 8
8. Leaf veins obscured by numerous oil glands; fruit valves prominent, stout ..... *E. annulata* (open-fruit mallee)
8′. Leaf veins obvious; fruit valves slender 9
9. Bark rough at the base and smooth above; operculum 1.5 to 2.5× longer than hypanthium; forming a lignotuber ..... *E. occidentalis* (flat-topped yate)
9′. Bark smooth to the ground, sometimes with partly detached flakes; operculum equal in length to the hypanthium; lacking a lignotuber ..... *E. astringens* (brown mallet)
1′. Valves of mature fruit enclosed, level with fruit rim, or slightly exserted 10
10. Branchlet pith without oil glands 11
11. Operculum horn-shaped, 2 to 3× longer than hypanthium ..... *E. gardneri* (blue mallet)
11′. Operculum conical to beaked, equal in length to hypanthium ..... *E. cypellocarpa* (monkey gum)
10′. Branchlet pith glandular 12
12. Peduncles glaucous ..... *E. stricklandii* (Strickland's gum)
12′. Peduncles green, yellow, or brown (not waxy) 13
13. Bark rough, furrowed, retained on trunk and limbs; buds shaped like mushrooms ..... *E. gomphocephala* (tuart)
13′. Bark smooth, shedding (sometimes with imperfectly shed rough bark on the basal area of trunk); buds variously shaped 14
14. Buds and fruits usually in clusters of more than 7 15
15. Operculum conical or rounded ..... *E. accedens* (powder bark wandoo)
15′. Operculum horn-shaped 16
16. Leaves very glossy, green; flowers yellow ..... *E. macrandra* (river yate)
16′. Leaves dull, slightly blue-green; flowers white ..... *E. wandoo* (wandoo)
14′. Buds and fruits in clusters of 7 17
17. Some or all stamens inflexed in bud (bent downward under operculum); operculum rounded, conical or beaked 18
18. Operculum narrower than the rest of the bud; flowers red, yellow, or chartreuse ..... *E. cernua* (red-flowered moort)
18′. Operculum same width as the rest of the bud; flowers white ..... *E. incrassata* (ridge-fruited mallee)
17′. All stamens erect when in bud (not bent under operculum); operculum conical or horn-shaped 19
19. Buds smooth, not ridged ..... *E. eremophila* (sand mallet)
19′. Buds ridged or winged 20
20. Leaves lanceolate (usually > 5× longer than wide) ..... *E. utilis* (coastal moort)
20′. Leaves orbicular or ovate (usually < 3× longer than wide) 21
21. Operculum 1.5 to 3× longer than the rest of the bud; valves 4; flowers yellow ..... *E. platypus* (moort)
21′. Operculum same length as the rest of the bud; valves 5 or 6; flowers red ..... *E. nutans* (red-flowered moort)

Group 8, Trees and Mallees Having Fruit with Enclosed Valves or Valves Level with the Fruit Rim

This group contains species in which the mature fruit form valves (the distal end of the capsule that dehisces to allow for seed dispersal) are enclosed and do not emerge from inside the hypanthium (or fruit rim), or that extend to the level of the fruit rim, but not beyond it. Examples of species with valves of mature dehiscent fruit that are either sunken below (proximal to) the fruit rim (e.g., *Eucalyptus torquata* Luehm.) or level with fruit rim (e.g., *E. spathulata* Hook.) (cf. Fig. 4E, G, *E. camaldulensis* Dehnh., 4I, *E. leuoxylon* F. Muell.).

1. Mallees or multistemmed shrubs 2
2. Buds and fruits square in cross-section 3

3. Outer stamens without anthers, flowers white or pink ..... *Eucalyptus calycogona* (square-fruited mallee)
3′. All stamens with anthers, flowers yellow ..... *E. roycei* (Shark Bay mallee)
2′. Buds and fruits round in cross-section 4
4. Buds and fruits glaucous ..... *E. caesia* subsp. *caesia* (caesia)
4′. Buds and fruits not covered with wax 5
5. Leaves held upright on the stem (ascending) ... *E. cneorifolia* (Kangaroo Island narrow-leaved mallee)
5′. Leaves hanging vertically or perpendicular to the stem (spreading) 6
6. Leaves usually with lenticels (indentations) along the edges; buds usually ribbed; operculum beaked ..... *E. incrassata* (ridge-fruited mallee)
6′. Leaves lacking indentations on the distal margins; buds ribbed or not; operculum variously shaped 7
7. Branchlet pith glandular 8
8. Bark rough to the smallest stems 9
9. Peduncles slender, upright; buds pedicellate; flowers white . . . . *E. loxophleba* (York gum)
9′. Peduncles stout, prominently downturned; buds sessile; flowers yellow . . . . *E. grossa* (coarse-leaved mallee)
8′. Bark smooth, or rough only on the lower portion of the trunk 10
10. Flowers red or yellow; fruit funnel-shaped ... *E. erythronema* (red-flowered mallee)
10′. Flowers white; fruit cylindrical to barrel-shaped 11
11. Leaves glossy, linear to narrowly lanceolate, < 1 cm wide . . . . *E. cylindrocarpa* (woodline mallee)
11′. Leaves dull, lanceolate, > 1.5 cm wide ..... *E. dumosa* (white mallee)
7′. Branchlet pith without oil glands 12
12. Bark smooth 13
13. Buds and fruits sessile or shortly pedicellate (< 0.2 cm) . . . . *E. kitsoniana* (Gippsland mallee)
13′. Buds and fruits pedicellate ..... *E. flocktoniae* (merrit)
12′. Bark rough 14
14. Leaves with conspicuous black oil dots; operculum scar present . . . . *E. gracilis* (white mallee)
14′. Leaves lacking black dots; operculum scar absent 15
15. Leaves linear or narrowly lanceolate, green; buds green . . . . *E. viridis* (green mallee)
15′. Leaves lanceolate, bluish gray or bluish green; buds glaucous . . . . *E. polybractea* (blue-leaved mallee)
1′. Trees 16
16. Buds and fruits sessile or shortly pedicellate (< 0.2 cm) 17
17. Crown of adult trees contain sessile juvenile leaves ..... *E. parvula* (small-leaved gum)
17′. Crown of adult trees with petiolate adult leaves only 18
18. Branchlet pith glandular ..... *E. dundasii* (Dundas blackbutt)
18′. Branchlet pith without oil glands 19
19. Bark rough to small branches ..... *E. goniocalyx* (long-leaved box)
19′. Bark mostly smooth 20
20. Inflorescence often subtended by a prominent bract; bark coppery in color; operculum rounded ..... *E. kitsoniana* (Gippsland mallee)
20′. Inflorescence not subtended by a bract; bark pale gray or cream-colored; operculum conical ..... *E. nitens* (silvertop)
16′. Buds and fruits pedicellate 21
21. Bark smooth, shedding completely to the ground 22
22. Flowers lemon yellow; bark white or gray; leaves lanceolate, dull; buds glaucous . . . . *E. woodwardii* (lemon-flowered gum)
22′. Flowers white; bark coppery or pinkish gray; leaves linear or narrowly lanceolate, glossy; buds green 23
23. All stamens erect in bud (not bent under operculum); operculum horn-shaped; leaves linear, < 0.5 cm wide ..... *E. spathulata* (swamp mallet)
23′. Stamens inflexed in bud (bent downward under operculum); operculum rounded, beaked or conical; leaves lanceolate to narrowly lanceolate, > 0.5 cm wide 24
24. Buds conspicuously ribbed ..... *E. pterocarpa* (Norseman gum)
24′. Buds smooth ..... *E. cylindrocarpa* (woodline mallee)
21′. Bark rough, retained on lower trunk, bark on limbs rough or smooth 25
25. Outer stamens without anthers; branchlet pith without oil glands 26
26. Leaves with conspicuous black oil dots; operculum scar present; operculum rounded or flattened ..... *E. gracilis* (white mallee)
26′. Leaves lacking black dots; operculum scar absent; operculum beaked or conical . . . . *E. melliodora* (honey box)
25′. All stamens with anthers; branchlet pith glandular 27

27. Bark rough to the smallest branches ..... *E. loxophleba* (York gum)
27′. Bark rough at the base, smooth and shedding on small branches 28
28. Flowers pink; leaves dull, bluish green; branchlets green, yellow or red ..... *E. torquata* (coral gum)
28′. Flowers white; leaves green; branchlets often glaucous ..... *E. lesouefii* (Goldfields' blackbutt)

Group 9, Trees and Mallees Having Fruit with Valves Clearly Exserted Beyond the Rim of the Fruit

This group contains species in which the valves of the mature fruit are clearly exserted beyond (distal to) the rim of the fruit or hypanthium (e.g., *Eucalyptus camaldulensis* Dehnh. and *E. mannifera* Mudie) (Fig. 4C, E, G).

1. Branchlets and buds glaucous 2
2. Leaves ovate to elliptical ..... *Eucalyptus orbifolia* (round-leaved mallee)
2′. Leaves lanceolate 3
3. Operculum longer than hypanthium ..... *E. blakelyi* (Blakely's red gum)
3′. Operculum equal in length to hypanthium ..... *E. dealbata* (hill red gum)
1′. Branchlets not covered with wax 4
4. Bark rough, furrowed, retained on most or all of the trunk, upper limbs either rough or smooth 5
5. Buds and fruits clearly sessile ..... *E. goniocalyx* (long-leaved box)
5′. Buds and fruits pedicellate, even if shortly so 6
6. Mallee or shrub 7
7. Leaves linear, < 0.5 cm wide ..... *E. formanii* (die hardy mallee)
7′. Leaves lanceolate, > 0.75 cm wide 8
8. Valves needlelike, fragile ..... *E. oleosa* (red morrell)
8′. Valves broad, 3-lobed ..... *E. mannensis* (Mann Range mallee)
6′. Tree 9
9. Bark shedding in long ribbons from upper limbs and sometimes upper part of the trunk ... 10
10. Bark loosely fibrous and fissured; fruit disk not prominent, flat or slightly raised ... . *E. macarthurii* (Paddy's River box)
10′. Bark rough and compact; fruit disk prominent, clearly ascending ..... *E. smithii* (blackbutt peppermint)
9′. Bark not shedding in ribbons, rough to the smallest branches or smooth on the smallest branches 11
11. Juvenile leaves very glaucous, crenulate ..... *E. bridgesiana* (apple box)
11′. Juvenile leaves only slightly waxy, or green, not crenulate (entire) 12
12. Fruit sessile or nearly so (pedicels < 0.2 cm long) ..... *E. aggregata* (black gum)
12′. Fruit pedicellate 13
13. Disk of fruit steeply ascending ..... *E. brassiana* (Cape York red gum)
13′. Disk of fruit level or only slightly ascending 14
14. Bark fibrous, brown; leaves narrowly lanceolate; disk of fruit thin, slightly ascending ..... *E. nicholii* (narrow-leaved black peppermint)
14′. Bark rough, compact, gray; leaves lanceolate to broadly lanceolate to ovate; disk of fruit broad, level ..... *E. rudis* (flooded gum)
4′. Bark smooth, shedding (sometimes with imperfectly shed rough bark on basal area); upper limbs smooth ... 15
15. Branchlet pith glandular 16
16. Flowers yellow or chartreuse; fruit with a prominent flange around the rim; bark brownish or greenish ..... *E. dielsii* (cap-fruited mallet)
16′. Flowers white; fruit without a flange; bark tan or coppery ..... *E. salubris* (gimlet)
15′. Branchlet pith without oil glands 17
17. Bark coppery, salmon-pink, or orange, shiny; leaves glossy, dark green, linear or narrowly lanceolate; fruit valves thin, needlelike ..... *E. salmonophloia* (salmon gum)
17′. Bark white, gray, tan, mottled, dull; leaves green, dull bluish green, or olive-green, lanceolate; fruit valves prominent, triangular 18
18. Bark white, powdery to the touch 19
19. Leaves dull, bluish green ..... *E. mannifera* (brittle gum, red spotted gum)
19′. Leaves glossy green ..... *E. scoparia* (Wallangara white gum)
18′. Bark gray or tan, sometimes white, not powdery 20
20. Fruit funnel-shaped; leaves glossy, often lacking oil glands ..... *E. ovata* (black gum, swamp gum)
20′. Fruit cup-shaped or hemispherical; leaves dull, with translucent oil glands 21
21. Juvenile leaves opposite for more than 10 pairs ..... *E. dunnii* (Dunn's white gum)
21′. Juvenile leaves opposite for fewer than 5 pairs 22

22. Operculum hemispheric, with a distinct beak, equal in length to hypanthium; branches often drooping ..... *E. camaldulensis* (red gum, river red gum)
22′. Operculum horn-shaped or conical, not beaked, 2× longer than hypanthium; branches often steeply ascending ..... *E. tereticornis* (forest red gum)

Taxonomic Treatment

Following the nomenclatural citation for those eucalypt species treated, common names are given. Each taxon is vouchered by a specimen and herbarium of deposit. Preceding the scientific name are two numbers that represent the taxon's position in the key. The key's group number is given first, followed by the particular couplet number in parentheses for the species considered. Both native ranges and the regional locations of naturalized populations, if known, are included. Eucalypt species without documented naturalized populations are included that are either persistent from cultivation or that are in wide horticultural use (e.g., plantations, honey production, shade, windbreaks, ornamentals).

I. Angophora Cav., Icon. 4: 21. 1797. *Eucalyptus* subg. *Angophora* (Cav.) Brooker, Austral. Syst. Bot. 13: 85. 2000. TYPE: *Angophora cordifolia* Cav.

Trees; bark rough or smooth. Leaves opposite, discolorous. Inflorescences compound, at branch tips. Flowers with the sepals persistent on woody fruit and the petals free within the inner floral whorl. Approximately 15 taxa, one of which is naturalized.

3 (1). Angophora costata (Gaertn.) Hochr. ex Britten, J. Bot. 54: 62. 1916. Basionym: *Metrosideros costata* Gaertn., Fruct. Sem. Pl. 1: 171. 1788.

Common name: apple gum.

Voucher: U.S.A. California, *Yost & Ritter 235* (OBI).

Native to: New South Wales, Queensland. Naturalized: California.

Trees; bark smooth, pink to orange. Leaves opposite, discolorous, lanceolate, petioled. Inflorescences compound, at branch tips. Flower buds with 5 small persistent sepal teeth; petals and stamens white. Fruits barrel-shaped to cylindrical, ribbed; valves enclosed.

II. Corymbia K. D. Hill & L. A. S. Johnson, Telopea 6: 214. 1995. *Eucalyptus* subg. *Corymbia* (K. D. Hill & L. A. S. Johnson) Brooker, Austral. Syst. Bot. 13: 85. 2000. TYPE: *Corymbia gummifera* (Gaertn.) K. D. Hill & L. A. S. Johnson [≡ *Metrosideros gummifera* Gaertn.].

Trees; bark rough or smooth. Leaves alternate, discolorous or concolorous, usually lanceolate, entire. Inflorescences compound, at branch tips or in leaf axils. Outer operculum held to just before flowering; operculum scar usually absent. Approximately 100 taxa, with nine species considered here.

4 (4). Corymbia aparrerinja K. D. Hill & L. A. S. Johnson, Telopea 6: 453. 1995.

Common name: ghost gum.

Voucher: Australia, Gosse Range, SW Macdonnell Ranges, May 1925, *H. Basedow s.n.* (type, NSW-10075, not seen).

Native to: North West Australia, North Australia, Queensland.

Trees; bark uniformly smooth, powdery, not mottled, white. Leaves alternate, concolorous, lanceolate, glossy. Inflorescences compound, in leaf axils. Flowers white, all stamens with anthers. Fruits cup-shaped, thin-walled.

3 (17′). Corymbia calophylla Lindl., Telopea 6: 240. 1995. Basionym: *Eucalyptus calophylla* Lindl., Edwards' Bot. Reg. 27(157): 72. 1841.

Common name: marri.

Voucher: U.S.A. California, *Ritter 93* (OBI).

Native to: South West Austrailia. Naturalized: Hawaii, New Zealand.

Trees; bark rough, flaky, brown. Leaves alternate, discolorous, broadly lanceolate. Inflorescences compound, at branch tips; operculum scar absent. Flowers white. Fruits urn-shaped, thick, woody, > 2 cm wide; valves enclosed; seeds wingless.

4 (3). Corymbia citriodora (Hook.) K. D. Hill & L. A. S. Johnson, Telopea 6: 388. 1995. Basionym: *Eucalyptus citriodora* Hook., J. Exped. Trop. Australia 235. 1848.

Common name: lemon-scented gum.

Voucher: U.S.A. California, *Eastwood s.n.* (CAS-45201).

Native to: Queensland. Naturalized: California, Hawaii, India, South Africa, South West Australia, Victoria, Zimbabwe.

Trees; bark smooth, white, cream, to pink. Leaves alternate, concolorous, narrowly lanceolate, lemon-scented. Inflorescences compound, in leaf axils. Flowers white. Fruits urn-shaped or barrel-shaped; valves enclosed.

4 (7). Corymbia eximia (Schauer) K. D. Hill & L. A. S. Johnson, Telopea 6: 383. 1995. Basionym: *Eucalyptus eximia* Schauer in Walp., Repert. Bot. Syst. 2(5): 925–926. 1843.

Common name: yellow bloodwood.

Voucher: U.S.A. California, *Yost & Ritter 273* (OBI).

Native to: New South Wales.

Trees; bark rough, yellowish or tan, flaky. Leaves alternate, concolorous, sickle-shaped, dull, bluish green. Fruits barrel-shaped or urn-shaped; valves enclosed.

3 (17). Corymbia ficifolia (F. Muell.) K. D. Hill & L. A. S. Johnson, Telopea 6: 245. 1995. Basionym: *Eucalyptus ficifolia* F. Muell., Fragm. 2(13): 85. 1860.

Common name: red-flowering gum.

Voucher: U.S.A. California, *B. W. Thompson 515* (OBI).

Native to: South West Australia. Naturalized: Hawaii, New Zealand, South Africa.

Trees; bark rough, flaky, brown. Leaves alternate, discolorous, broadly lanceolate. Inflorescences compound, at branch tips; operculum scar absent. Flowers red, orange, pink. Fruits urn-shaped, thick, woody, > 2 cm wide; valves enclosed; seed winged.

3 (16). Corymbia gummifera (Sol. ex Gaertn.) K. D. Hill & L. A. S. Johnson, Telopea 6: 233. 1995. Basionym: *Metrosideros gummifera* Gaertn., Fruct. Sem. Pl. 1: 170, tab. 34, fig. I.

Common name: red bloodwood.

Voucher: U.S.A. California, *Ritter 68* (OBI).

Native to: New South Wales, Southern Queensland.

Trees; bark rough, flaky, brown. Leaves alternate, discolorous, lanceolate. Inflorescences compound, at branch tips; operculum scar absent. Flowers white. Fruits urn-shaped, thick, woody, < 1.5 cm wide; valves enclosed.

4 (4′). Corymbia maculata (Hook.) K. D. Hill & L. A. S. Johnson, Telopea 6: 393. 1995. Basionym: *Eucalyptus maculata* Hook., Icon. Pl. 7, pl. 619. 1944.

Common name: spotted gum.

Voucher: U.S.A. California, *Ritter 123* (OBI).

Native to: New South Wales, Victoria. Naturalized: Hawaii, South Africa, South West Australia.

Trees; bark smooth, mottled cream, yellow, gray, pink, to green or brown, shed in plates. Leaves alternate, concolorous, broadly lanceolate. Inflorescences compound, in leaf axils. Flowers white. Fruits urn-shaped or barrel-shaped; valves enclosed.

3 (15). Corymbia ptychocarpa (F. Muell.) K. D. Hill & L. A. S. Johnson, Telopea 6: 250. 1995. Basionym: *Eucalyptus ptychocarpa* F. Muell., J. Proc. Linn. Soc., Bot. 3: 90. 1859.

Common name: swamp bloodwood.

Voucher: Australia, Northern Territory, Gulf of Carpentaria, 22 July 1856, *F. Mueller s.n.* (type, K, not seen).

Native to: North West Australia, North Australia, Northern Queensland.

Trees; bark rough, fibrous, flaky, brown. Leaves alternate, discolorous, broadly lanceolate. Inflorescences compound, at branch tips. Buds ribbed, scaly; operculum scar absent. Flowers white. Fruits barrel-shaped, ribbed, ridged; valves enclosed.

3 (5′). Corymbia torelliana (F. Muell.) K. D. Hill & L. A. S. Johnson, Telopea 6: 385. 1995. Basionym: *Eucalyptus torelliana* F. Muell., Fragm. (Mueller) 10(87): 106–107. 1877.

Common name: blood-leaf gum or cadaghi.

Voucher: U.S.A. California, *Yost & Ritter 314* (OBI).

Native to: Northern Queensland. Naturalized: China, Florida, Hawaii, Queensland.

Trees; bark smooth, slaty-green, dark green, or gray, older trees with a rough stocking of bark on the lower trunk. Leaves alternate, discolorous, broadly lanceolate, some leaves in crown covered by bristly glands. Inflorescences compound, at branch tips. Flowers white. Fruits urn-shaped, sessile or nearly so, > 0.75 cm wide; valves enclosed.

III. Eucalyptus L'Hér., Sert. Angl., 18. 1788 [Jan. 1789]. TYPE: *Eucalyptus obliqua* L'Hér.

Trees, mallees, or shrubs; lignotuber present or absent; bark rough or smooth. Leaves alternate or opposite, discolorous or concolorous, linear, lanceolate to orbicular. Inflorescences compound, at branch tips, or axillary unbranched umbels, or flowers solitary in leaf axils. Operculum scar present or absent. At anthesis, flowers usually white, also red, pink, or yellow in some species. Fruits woody, usually cup-, barrel-, bell-, or urn-shaped; valves exserted, enclosed, or at rim level. Approximately 700 taxa, with 163 species known from cultivation and considered herein.

7 (15). Eucalyptus accedens W. Fitzg., J. Western Australia Nat. Hist. Soc. 1: 21. 1904.

Common name: powder bark wandoo.

Voucher: Australia, near Pingelly, Nov. 1903, *W. V. Fitzgerald s.n.* (type, NSW, not seen).

Native to: South West Australia.

Trees; bark smooth; branchlet pith glandular. Leaves alternate, concolorous, lanceolate. Inflorescences axillary; peduncle broad, flattened, and straplike. Buds 7, 9, or 11 per umbel; operculum conical or rounded, operculum scar present. At anthesis, flowers white. Fruits barrel-shaped; valves at rim level or slightly exserted.

3 (25′). Eucalyptus acmenoides Schauer in Walp., Bot. Syst. 2(5): 924. 1843.

Common name: white mahogany.

Voucher: U.S.A. California, *C. T. White 9072* (UC).

Native to: New South Wales, Queensland.

Trees; bark rough, fibrous. Leaves alternate, discolorous, lanceolate. Inflorescences axillary umbels; buds 11 to 15 per umbel; operculum conical to beaked, operculum scar absent. At anthesis, flowers white; all stamens with anthers; outer stamens inflexed in bud (bent downward under operculum). Fruits 0.5–1 cm wide, hemispherical to cup-shaped; valves at rim level or enclosed, tips free.

9 (12). Eucalyptus aggregata H. Deane & Maiden, Proc. Linn. Soc. New South Wales 24: 614. 1900.

Common name: black gum.

Voucher: U.S.A. California, *Yost & Ritter 205* (OBI).

Native to: New South Wales, Victoria.

Trees; bark rough, gray-brown, fibrous to the smallest branches. Leaves alternate, concolorous, lanceolate. Inflorescences as axillary umbels; buds 7 per umbel; operculum scar present. At anthesis, flowers white. Fruits nearly sessile (pedicels < 0.2 cm long); valves exserted.

4 (10) and 6 (2′). Eucalyptus albens Benth., Fl. Austral. 3: 219. 1867.

Common name: white box.

Voucher: U.S.A. California, *Yost & Ritter 364* (OBI).

Native to: New South Wales, South Australia, Southern Queensland, Victoria.

Trees; bark rough, gray, short-fibered, hard; branchlets glaucous. Leaves alternate, concolorous, lanceolate to ovate, dull, blue-green, gray-green or glaucous. Inflorescences compound at branch tips or unbranched umbels in leaf axils; buds sessile, glaucous, spindle-shaped; operculum scar absent. Fruits urn- or barrel-shaped, glaucous; valves enclosed.

4 (6′). Eucalyptus albopurpurea (Boomsma) D. Nicolle, J. Adelaide Bot. Gard. 19: 90. 2000. Basionym: *Eucalyptus lansdowneana* subsp. *albopurpurea* Boomsma, S. Austral. Naturalist 48: 55. 1974.

Common name: purple-flowered mallee.

Voucher: U.S.A. California, *Yost & Ritter 359* (OBI).

Native to: South Australia.

Mallees or shrubs; bark rough, gray, short-fibered, hard. Leaves alternate, concolorous, broadly lanceolate. Inflorescences compound, at branch tips. Operculum scar absent. At anthesis, flowers white, pink, mauve, or purple. Fruits cup- or barrel-shaped; valves enclosed.

6 (9). Eucalyptus amygdalina Labill., Nov. Holl. Pl. 2: 14, tab. 154. 1806.

Common name: black peppermint.

Voucher: Australia, 1902, *F. Walter s.n.* (UC-170397).

Native to: Tasmania.

Trees; bark rough, gray-brown, finely fibrous. Leaves alternate, concolorous, narrowly lanceolate, 0.4–1 cm wide; leaf side veins angling toward leaf margin, not parallel-veined. Inflorescences as axillary umbels; buds 11, 15, or more per umbel; operculum scar absent. At anthesis, flowers white; all stamens with anthers. Fruits sessile or nearly so (pedicels < 0.5 cm long); valves at rim level or enclosed.

5 (17). Eucalyptus angulosa Schauer in Walp., Repert. Bot. Syst. 2(5): 925. 1843.

Common name: ridge-fruited mallee.

Voucher: Western Australia, Swan River Colony, *J. Drummond 4* (type, BM, not seen).

Native to: South Australia, South West Australia.

Mallees or shrubs; lignotuber present; bark smooth. Leaves alternate, concolorous, lanceolate, glossy. Inflorescences axillary umbels; buds 3 per umbel, sessile or nearly so, distinctly ribbed, operculum ribbed, operculum scar present. Fruits cylindrical, < 2.5 cm wide; valves enclosed.

7 (8). Eucalyptus annulata Benth., Fl. Austral. 3: 234. 1867.

Common name: open-fruit mallee.

Voucher: Australia, *F. C. Vasek 690319-2* (UC).

Native to: South West Australia.

Mallees; bark smooth; branchlet pith glandular. Leaves alternate, concolorous, lanceolate, glossy; leaf veins obscured by numerous oil glands. Inflorescences axillary umbels; peduncles broad, flattened, and straplike; buds 7 per umbel, sessile. At anthesis, flowers cream to pale yellow. Fruits hemispherical; valves exserted, prominent, stout, tips free at maturity.

7 (9′). Eucalyptus astringens Maiden, Crit. Rev. Eucalyptus 7: 55. 1924. Basionym: *Eucalyptus occidentalis* var. *astringens* Maiden, J. Nat. Hist. Sci. Soc. Western Australia 3: 186. 1911.

Common name: brown mallet.

Voucher: U.S.A. California, *Ritter 63* (OBI).

Native to: South West Australia.

Small trees or shrubs, lacking a lignotuber; bark smooth, sometimes with partly detached flakes, shiny, gray, salmon to brown; branchlet pith glandular. Leaves alternate, concolorous, lanceolate, glossy. Inflorescences as axillary umbels; peduncles broad, flattened, and straplike; buds 7 per umbel; operculum equal in length to the hypanthium, operculum scar present. At anthesis, flowers cream to pale yellow. Fruits cup- to bell-shaped; valves exserted, tips free at maturity.

4 (13). Eucalyptus baueriana Schauer in Walp., Repert. Bot. Syst. 2(5): 924. 1843.

Common name: round-leaved box.

Voucher: Australia, *Ritter 84* (OBI).

Native to: New South Wales, Victoria.

Trees; bark rough, gray, short-fibered, hard; branchlets occasionally glaucous. Leaves alternate, concolorous, ovate, glossy. Inflorescences compound, at branch tips. Operculum scar present. At anthesis, flowers white; outer stamens without anthers; stamens shed together in a ring. Fruits urn- or barrel-shaped, glaucous; valves enclosed.

5 (23). Eucalyptus bicostata Maiden, Blakely & Simmonds, Blakely & Simmonds in Simmonds, Trees Other Lands New Zealand, Eucalypts 133. 1927.

Common name: Victorian blue gum.

Voucher: U.S.A. California, *Yost & Ritter 240* (OBI).

Native to: New South Wales, Victoria, South Australia, Tasmania.

Trees; bark smooth, usually with some imperfectly shed rough bark on the basal area of trunk. Leaves alternate, concolorous, lanceolate and sickle-shaped, dark green. Inflorescences as axillary umbels; peduncle absent; buds 3 per umbel, sessile, glaucous; operculum warty, flattened, with a central knob, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits sessile, hemispherical; valves at rim level.

9 (3). Eucalyptus blakelyi Maiden, Crit. Rev. Eucalyptus 4: 43. 1917.

Common name: Blakely's red gum.

Voucher: U.S.A. California, *Ritter 81* (OBI).

Native to: New South Wales, Southern Queensland, Victoria.

Trees; bark smooth, usually with some imperfectly shed rough gray bark on the basal area of trunk, upper limbs smooth; branchlets usually glaucous. Leaves alternate, concolorous, lanceolate; juvenile leaves opposite for fewer than 5 pairs. Inflorescences as axillary umbels; buds 7 per umbel, usually glaucous; operculum longer than the hypanthium, conical to horn-shaped. At anthesis, flowers white. Fruits hemispherical; valves exserted.

3 (22). Eucalyptus botryoides Sm., Trans. Linn. Soc. London 3: 286. 1797.

Common name: southern mahogany.

Voucher: Australia, *Ritter 56* (OBI).

Native to: New South Wales, Victoria. Naturalized: Hawaii, New Zealand, South Australia, South Africa, South West Australia.

Trees; bark rough, thick, gray, fibrous. Leaves alternate, discolorous, broadly lanceolate. Inflorescences axillary umbels; peduncles broad, flattened; buds 7 or more per umbel, sessile; operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits barrel-shaped, sessile; valves enclosed, tips free at maturity.

9 (13). Eucalyptus brassiana S. T. Blake, Austrobaileya 1(1): 1. 1977.

Common name: Cape York red gum.

Voucher: Australia, Queensland, Cooktown, 28 January 1958, *S. T. Blake 20194* (type, BRI, not seen).

Native to: Northern Queensland.

Trees; bark rough, hard, ironbark-like on lower trunk to ca. 3 m, then smooth, gray, white, cream, and yellow above. Leaves alternate, concolorous, lanceolate; juvenile leaves green, entire. Inflorescences axillary umbels; buds 7 per umbel; operculum scar present. At anthesis, flowers white. Fruits hemispherical, pedicellate; disk of fruit steeply ascending; valves exserted.

2 (5) and 9 (11). Eucalyptus bridgesiana R. T. Baker, Proc. Linn. Soc. New South Wales 23: 164. 1898.

Common name: apple box.

Voucher: Australia, *Ritter 102* (OBI).

Native to: New South Wales, Southern Queensland, Victoria. Naturalized: Hawaii, South Africa.

Trees; bark rough, fibrous, sometimes hard and ironbark-like. Juvenile leaves glaucous, crenulate, opposite; adult leaves alternate, concolorous, lanceolate. Inflorescences axillary umbels; buds 7 per umbel; operculum scar present. At anthesis, flowers white. Fruits hemispherical, pedicellate; disk of fruit ascending; valves exserted.

8 (4). Eucalyptus caesia subsp. **caesia** Benth., Fl. Austral. 3: 227. 1867.

Common name: caesia.

Voucher: U.S.A. California, *Yost & Ritter 358* (OBI).

Native to: South West Australia.

Mallees; bark smooth, older bark peeling and rolling in thin vertical strips; branchlets pendulous or upright, glaucous. Leaves alternate, concolorous, lanceolate. Inflorescences axillary umbels; buds 7 (sometimes 3) per umbel, glaucous; operculum smooth, operculum scar present. At anthesis, the flowers with filaments red or pink with yellow anthers. Fruits urn-shaped; disk of fruit descending; valves at rim level or enclosed.

5 (9). Eucalyptus caesia subsp. **magna** Brooker & Hopper, Nuytsia 4: 117. 1982.

Common name: silver princess.

Voucher: U.S.A. California, *Ritter 119* (OBI).

Native to: South West Australia.

Mallees; bark smooth, older bark peeling and rolling in thin vertical strips; branchlets pendulous, glaucous. Leaves alternate, concolorous, lanceolate. Inflorescences axillary umbels; buds usually 3 per umbel, glaucous; operculum smooth, operculum scar present. At anthesis, flowers with filaments red or pink with yellow anthers. Fruits urn-shaped; disk of fruit descending; valves at rim level or enclosed.

Eucalyptus caesia subsp. *magna* is more widely cultivated than *E. caesia* subsp. *caesia* and has larger leaves, buds, and fruit.

8 (3). Eucalyptus calycogona Turcz., Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg 10: 338. 1852.

Common name: square-fruited mallee.

Voucher: U.S.A. California, *Yost & Ritter 252* (OBI).

Native to: South Australia, South West Australia, Victoria.

Mallees or shrubs; bark smooth, gray; branchlet pith without oil glands. Leaves alternate, concolorous, lanceolate. Inflorescences axillary umbels; buds usually 7 per umbel, square in cross-section. At anthesis, flowers white, occasionally pink; outer stamens without anthers. Fruits square in cross-section; valves enclosed.

9 (22). Eucalyptus camaldulensis Dehnh., Cat. Pl. Hort. Camald. (ed. 2), 20. 1832.

Common name: red gum or river red gum.

Voucher: U.S.A. California, *Sanders 21982* (CAS).

Native to: North Australia, New South Wales, North West Australia, South Australia, South West Australia, Queensland, Victoria. Naturalized: Argentina, Bangladesh, California, Hawaii, India, Mediterranean Basin, South Australia, South Africa, Zimbabwe.

Trees; bark smooth, not powdery to the touch, usually with some imperfectly shed rough gray bark on the basal area of trunk; branchlet pith without oil glands, often drooping. Juvenile leaves opposite for fewer than 5 pairs; adult leaves alternate, concolorous, lanceolate. Inflorescences axillary umbels; buds 7 per umbel; operculum hemispherical and beaked, equal in length to hypanthium, operculum scar present. At anthesis, flowers white. Fruits hemispherical; valves exserted.

7 (18). Eucalyptus cernua Brooker & Hopper, Nuytsia 14: 342. 2002.

Common name: red-flowered moort.

Voucher: U.S.A. California, *Yost & Ritter 234* (OBI).

Native to: South West Australia.

Mallees or shrubs; lignotuber present or absent; bark smooth; branchlet pith glandular. Leaves alternate, concolorous, lanceolate to ovate, glossy. Inflorescences axillary umbels; peduncles broad, flattened, and straplike; buds 7 per umbel; operculum rounded, narrower than the hypanthium; some or all stamens inflexed in bud (bent downward under operculum). At anthesis, flowers red, yellow, or chartreuse. Fruits sessile, with narrow longitudinal ridges; valves enclosed.

1 (16). Eucalyptus cinerea F. Muell. ex Benth., Fl. Austral. 3: 239. 1867.

Common name: mealy stringybark or argyle apple.

Voucher: U.S.A. California, *Keil 11873-10* (OBI).

Native to: New South Wales, Victoria. Naturalized: Hawaii, New Zealand, South Africa.

Trees; bark rough, brown, thick, fibrous; crown of mature tree composed primarily of juvenile and intermediate leaves. Juvenile leaves opposite, not fused, ovate, glaucous, base wrapping around stem; intermediate leaves opposite, pedicellate, glaucous, ovate to lanceolate. Inflorescences axillary umbels; buds 3 per umbel, diamond-shaped, glaucous. At anthesis, flowers white. Fruits sessile, funnel-shaped; valves exserted.

3 (7). Eucalyptus cladocalyx F. Muell., Linnaea 25(4): 388–389. 1853.

Common name: sugar gum.

Voucher: U.S.A. California, *R. Philbrick B65-44* (CAS).

Native to: South Australia. Naturalized: California, Hawaii, South Africa, South West Australia, Victoria.

Trees; bark smooth, mottled with patches of white, orange, gray, and brown. Leaves alternate, discolorous, shiny, lanceolate to sickle-shaped; leaf oil glands small, obscure. Inflorescences unbranched umbels; buds and fruits born on leafless sections of branchlets; buds 7, 9, or 11 per umbel; operculum rounded, operculum scar present. At anthesis, flowers white. Fruits cylindrical, urn- or barrel-shaped, often ribbed; valves enclosed.

3 (14). Eucalyptus cloeziana F. Muell., Fragm. 11(89): 44–45. 1878.

Common name: gympie messmate.

Voucher: U.S.A. California, 1919, *W. D. Francis s.n.* (UC-206164).

Native to: Queensland.

Trees; bark rough, flaky. Leaves alternate, discolorous, lanceolate. Inflorescences compound, in leaf axils; operculum scar absent. At anthesis, flowers white. Fruits hemispherical; valves at rim level or exserted.

8 (5). Eucalyptus cneorifolia DC., Prodr. 3: 220. 1828.

Common name: Kangaroo Island narrow-leaved mallee.

Voucher: U.S.A. California, *P. G. Wilson 896* (UC).

Native to: South Australia.

Trees or mallees; bark rough, compacted, gray-brown on trunk or lower limbs, smooth and white or gray on upper limbs and branches. Leaves alternate, concolorous, linear to narrowly lanceolate, erect and ascending on the stem, glossy. Inflorescences axillary umbels; buds 7, 9, or 11 per umbel, round in cross-section; operculum conical, operculum scar present. Flowers white. Fruits cup-shaped; valves near rim level or slightly exserted.

5 (15), 5 (30), and 6 (18). Eucalyptus coccifera Hook. f., London J. Bot. 6: 477. 1847.

Common name: Tasmanian snow gum.

Voucher: U.S.A. California, *H. Walker 2940* (UC).

Native to: Tasmania.

Trees or mallees; bark smooth; young branches warty, glaucous. Leaves alternate, concolorous, lanceolate to ovate, glossy, with a delicate hook at the tip; leaf side veins angling toward leaf margin, not parallel-veined. Inflorescences axillary umbels; buds 3, 7, or 9 per umbel, wrinkled and warty, glaucous, round in cross-section; operculum flattened, operculum scar absent. At anthesis, flowers white; all stamens with anthers. Fruits hemispherical, shortly pedicellate, rarely sessile; valves at rim level or enclosed.

7 (6). Eucalyptus conferruminata D. J. Carr & S. G. M. Carr, Austral. J. Bot. 28(5–6): 535. 1980.

Common name: Bald Island marlock.

Voucher: U.S.A. California, *Keil 11873-19* (OBI).

Native to: South West Australia. Naturalized: California, South Africa, Victoria.

Trees or shrubs; lignotuber absent; bark smooth, white and gray; branchlet pith without oil glands; apical bud 1–2.2 cm long, triangular in cross-section. Leaves alternate, concolorous, elliptical. Inflorescences axillary umbels; peduncles broad, flattened, and straplike; buds more than 7 per umbel, fused at the base; operculum stout, horn-shaped. At anthesis, flowers green or chartreuse. Fruits fused at the base into a woody mass to 4 cm wide; valves exserted, tips connected at maturity.

1 (18′). Eucalyptus conspicua L. A. S. Johnson & K. D. Hill, Telopea 4(2): 235. 1991.

Common name: Gippsland swamp-box.

Voucher: U.S.A. California, *Ritter 34* (OBI).

Native to: New South Wales, Victoria.

Trees; bark rough, brown, thick, fibrous; crown of mature tree composed primarily of juvenile and intermediate leaves. Crown leaves opposite or alternate, concolorous, entire, not fused, ovate to lanceolate, glaucous, sessile and wrapping around stem or petiolate. Inflorescences axillary umbels; buds 7 per umbel, diamond-shaped, glaucous; operculum scar present. At anthesis, flowers white. Fruits sessile, funnel-shaped; valves exserted.

4 (8). Eucalyptus coolabah Blakely & Jacobs, Key Eucalypts 245. 1934.

Common name: coolibah.

Voucher: U.S.A. California, 1945, *M. S. Clemens s.n.* (UC-081390).

Native to: North West Australia, North Australia, South Australia, Queensland, New South Wales.

Trees; bark rough, gray, short-fibered, hard. Leaves alternate, concolorous, lanceolate, dull, blue-green, or gray-green. Inflorescences compound, at branch tips; buds often glaucous; operculum scar present. At anthesis, flowers white. Fruits hemispherical; valves exserted.

1 (15). Eucalyptus cordata Labill., Nov. Holl. Pl. 2: 13. 1806.

Common name: heart-leaved silver gum.

Voucher: U.S.A. California, *Yost & Ritter 167* (OBI).

Native to: Tasmania.

Trees; bark smooth; branchlets glaucous; crown of mature tree composed primarily of juvenile and intermediate leaves. Crown leaves opposite or alternate, concolorous or slightly discolorous, heart-shaped, or ovate, or lanceolate, base wrapping around the stem, dull, blue-green, glaucous, some leaf margins crenulate. Inflorescences axillary umbels; buds 3 per umbel, sessile, glaucous; operculum scar present. At anthesis, flowers white. Fruits sessile, cup-shaped, ca. 1 cm wide; valves at rim level.

7 (4). Eucalyptus cornuta Labill., Voy. Rech. Pérouse 1: 402, tab. 17. 1800.

Common name: yate.

Voucher: U.S.A. California, *Ritter 35* (OBI).

Native to: South West Australia.

Trees, occasionally mallees; bark rough; branchlet pith glandular, occasionally not glandular. Leaves alternate, concolorous, lanceolate to ovate, glossy. Inflorescences axillary umbels; peduncle flattened; buds elongated, free at the base; operculum horn-shaped, operculum scar present. At anthesis, flowers cream to yellow. Fruits sessile; valves exserted, tips connected at maturity.

5 (13′). Eucalyptus cosmophylla F. Muell., Trans. & Proc. Victorian Inst. Advancem. Sci. 32. 1855.

Common name: cup gum.

Voucher: U.S.A. California, *Yost & Ritter 176* (OBI).

Native to: South Australia.

Mallees, occasionally trees; bark smooth, gray. Leaves alternate, concolorous, broadly lanceolate. Inflorescences axillary umbels; buds 3 per umbel; operculum scar present. At anthesis, flowers white. Fruits sessile, cup-shaped; valves near rim level.

2 (6). Eucalyptus crebra F. Muell., J. Proc. Linn. Soc., Bot. 3: 87. 1859 [1858].

Common name: narrow-leaved ironbark.

Voucher: U.S.A. California, *Ritter 103* (OBI).

Native to: New South Wales, Queensland. Naturalized: Hawaii, South Africa.

Trees; bark rough, ironbark type, deeply furrowed, hard, dark brown, gray, or black, retained on trunk and limbs. Leaves alternate, concolorous, narrowly lanceolate, dull, gray-green. Inflorescences compound, at branch tips. Operculum rounded, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits cup- or barrel-shaped; valves enclosed.

1 (17). Eucalyptus crenulata Blakely & Beuzev., Contr. New South Wales Natl. Herb. 1: 37. 1939.

Common name: Buxton gum.

Voucher: U.S.A. California, *Ritter 46* (OBI).

Native to: Victoria.

Trees; bark rough, compacted, gray, brown, or black; branchlets occasionally glaucous; crown of mature tree composed primarily of juvenile leaves. Crown leaves opposite, sessile, crenulate, not fused, ovate or heart-shaped, glaucous, base wrapping around stem. Inflorescences axillary umbels; buds 7, 9, or 11 per umbel, glaucous; operculum scar present. At anthesis, flowers white. Fruits cup-shaped; valves enclosed.

1 (9′). Eucalyptus crucis Maiden, Crit. Rev. Eucalyptus 6(59): 514, pl. 242 (7). 1923.

Common name: Southern Cross silver mallee.

Voucher: U.S.A. California, 1941, *H. W. Sheperd s.n.* (UC-180502).

Native to: South West Australia.

Mallees or shrubs; bark smooth, older bark peeling and rolling in thin vertical strips; branchlets glaucous, round in cross-section; crown of mature tree composed primarily of juvenile leaves. Crown leaves opposite, concolorous, sessile, orbicular or heart-shaped. Inflorescences axillary umbels; buds 7 per umbel, spherical, glaucous; operculum smooth, rounded, operculum scar present. At anthesis, flowers white to pale yellow. Fruits hemispherical, > 1 cm wide; valves exserted.

3 (2). Eucalyptus curtisii Blakely & C. T. White, Proc. Roy. Soc. Queensland 42: 82. 1930 [1931].

Common name: Plunkett mallee.

Voucher: U.S.A. California, *Yost & Ritter 328* (OBI).

Native to: Southern Queensland.

Mallees, rarely small trees; bark smooth, gray. Leaves alternate, discolorous, lanceolate; oil glands obscure or absent from leaves. Inflorescences compound, at branch tips; buds with 4 small persistent sepals; petals not entirely united into an operculum. At anthesis, flowers white; all stamens with anthers. Fruits cup-shaped, dehiscing by a cap rather than opening by valves.

8 (11) and 8 (24′). Eucalyptus cylindrocarpa Blakely, Key Eucalypts 116. 1934.

Common name: woodline mallee.

Voucher: U.S.A. California, *Ritter JR28* (OBI).

Native to: South West Australia.

Trees or mallees; bark smooth, pinkish, gray, coppery, or occasionally white; branchlet pith glandular. Leaves alternate, concolorous, linear to narrowly lanceolate, glossy. Inflorescences axillary umbels; peduncles slender; buds 7, 9, or 11 per umbel, round in cross-section, pedicellate, smooth; operculum beaked or conical, operculum scar present; stamens inflexed in bud (bent downward under operculum). At anthesis, flowers white. Fruits cylindrical to barrel-shaped; valves enclosed.

7 (11′). Eucalyptus cypellocarpa L. A. S. Johnson, Contr. New South Wales Natl. Herb. 3: 114. 1962.

Common name: monkey gum.

Voucher: U.S.A. California, *R. Coveny & C. Bartlett 5352* (UC).

Native to: New South Wales, Victoria.

Trees; bark smooth, yellowish, gray, cream, or orange-brown; branchlet pith without oil glands. Leaves alternate, concolorous, lanceolate. Inflorescences axillary umbels; peduncles flattened; buds 7 per umbel; operculum beaked or conical, equal in length to the hypanthium, operculum scar present. At anthesis, flowers white. Fruits cylindrical to barrel-shaped; valves enclosed.

5 (26′). Eucalyptus dalrympleana Maiden, Forest Fl. N. S. W. 7: 137. 1920.

Common name: broad-leaved ribbon gum.

Voucher: U.S.A. California, *Yost & Ritter 338* (OBI).

Native to: New South Wales, South Australia, Southern Queensland, Tasmania, Victoria.

Trees; bark smooth, occasionally with short stocking of rough bark; white, gray, or cream, shedding in ribbons. Juvenile leaves ovate to elliptical, dull, blue-green; adult leaves alternate, concolorous, lanceolate. Inflorescences axillary umbels; buds 3 per umbel, round in cross-section; operculum conical, smooth, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits cup-shaped, disk raised; valves exserted.

9 (3′). Eucalyptus dealbata Schauer in Walp., Repert. Bot. Syst. 2(5): 924. 1843.

Common name: hill red gum.

Voucher: U.S.A. California, *Ritter 88* (OBI).

Native to: New South Wales, Southern Queensland.

Trees; bark smooth, usually with some imperfectly shed rough gray bark on the basal area of trunk, upper limbs smooth; branchlets glaucous. Juvenile leaves opposite for fewer than 5 pairs; adult leaves alternate, concolorous, lanceolate, dull, occasionally blue-green. Inflorescences axillary umbels; buds 7 per umbel, glaucous; operculum equal in length to the hypanthium, conical to horn-shaped, operculum scar present. At anthesis, flowers white. Fruits hemispherical; valves exserted.

3 (9). Eucalyptus deanei Maiden, Proc. Linn. Soc. New South Wales 29: 471. 1904.

Common name: mountain blue gum.

Voucher: Australia, New South Wales, The Valley, Springwood, Apr. 1888, *H. Deane s.n.* (NSW, not seen).

Native to: New South Wales. Naturalized: Hawaii, South Africa.

Trees; bark smooth, occasionally with a short stocking of rough bark at the base. Leaves alternate, discolorous, lanceolate. Inflorescences axillary umbels; buds 7, 9, or 11 per umbel; operculum conical to rounded, operculum scar present. At anthesis, flowers white. Fruits cup-shaped; valves at rim level or slightly exserted.

3 (5). Eucalyptus deglupta Blume, Mus. Bot. 1: 83. 1850.

Common name: rainbow gum or Mindanao gum.

Voucher: U.S.A. California, *E. F. De Vogel 5213* (UC).

Native to: Tropical areas to the north of Australia. Naturalized: Hawaii.

Trees; bark smooth, multicolored, green, lime-green, orange, pink, blue, red, and gray. Leaves alternate, discolorous, lanceolate to ovate. Inflorescences com-

pound, at branch tips. At anthesis, flowers white. Fruits < 0.5 cm wide, hemispherical; valves exserted.

6 (17). Eucalyptus delegatensis R. T. Baker, Proc. Linn. Soc. New South Wales 25: 305. 1900.

Common name: alpine ash.

Voucher: U.S.A. California, *Yost & Ritter 179* (OBI).

Native to: New South Wales, Tasmania, Victoria. Naturalized: New Zealand, South Africa.

Trees; bark rough on lower trunk, finely fibrous, gray or brown, smooth on upper trunk and larger limbs, white or cream. Leaves alternate, concolorous, lanceolate to sickle-shaped; leaf side veins angling toward leaf margin, not parallel-veined. Inflorescences as axillary umbels; peduncles round in cross-section; buds 7 to 15 per umbel, often glaucous; operculum scar absent. At anthesis, flowers white; all stamens with anthers. Fruits pedicellate, hemispherical or barrel-shaped; valves at rim level or enclosed.

9 (16). Eucalyptus dielsii C. A. Gardner, J. Roy. Soc. Western Australia 12: 67. 1927.

Common name: cap-fruited mallet.

Voucher: Australia, *H. Steedman 119723* (UC-1392242).

Native to: South West Australia.

Mallees or small trees; bark smooth, brownish or greenish; branchlet pith glandular. Leaves alternate, concolorous, lanceolate, glossy. Inflorescences axillary umbels; peduncles round in cross-section; buds 7, occasionally 9 per umbel. At anthesis, flowers yellow or chartreuse. Fruits with a prominent flange around the rim; valves near rim level or exserted.

3 (7′). Eucalyptus diversicolor F. Muell., Fragm. 3(22): 131. 1863.

Common name: karri.

Voucher: U.S.A. California, *Ritter 57* (OBI).

Native to: South West Australia.

Trees; bark smooth, cream, orange, gray, and brown, mottled, shedding in plates and patches. Leaves alternate, discolorous, lanceolate to broadly lanceolate, dull; leaf oil glands obvious. Inflorescences axillary umbels; buds 7 per umbel; operculum rounded to conical. At anthesis, flowers white. Fruits barrel-shaped, smooth; valves enclosed.

6 (12). Eucalyptus dives Schauer in Walp., Repert. Bot. Syst. 2(5): 926. 1843.

Common name: blue peppermint.

Voucher: Australia, *J. H. Maiden 10.98* (UC-19827).

Native to: New South Wales, Victoria.

Trees; bark rough, gray-brown, finely fibrous. Juvenile leaves opposite, sessile, ovate, gray-green to glaucous; adult leaves alternate, concolorous, lanceolate to sickle-shaped, > 1 cm wide; leaf side veins angling toward leaf margin, not parallel-veined; leaf bases tapering evenly, or almost evenly, to the petiole. Inflorescences axillary umbels; buds 11, 15 or more per umbel; operculum scar absent. At anthesis, flowers white; all stamens with anthers. Fruits cup-shaped; valves at rim level.

5 (5). Eucalyptus dolichorhyncha (Brooker) Brooker & Hopper, Nuytsia 9(1): 57. 1993. Basionym: *Eucalyptus forrestiana* subsp. *dolichorhyncha* Brooker, J. Roy. Soc. Western Australia 56(3): 74. 1973.

Common name: fuchsia gum.

Voucher: Australia, *R. Coveny 5192* (UC).

Native to: South West Australia.

Small trees or shrubs, lacking a lignotuber; bark smooth, pale gray, shedding in ribbons; branchlet pith without oil glands. Leaves alternate, concolorous, lanceolate, thin, dull. Inflorescences solitary flowers in leaf axils; buds bright red, square in cross-section, with 4 wings, pedicellate; peduncles slender; operculum slender and beaked, operculum scar present. At anthesis, flowers yellow. Fruits square in cross-section, winged; valves enclosed.

8 (11′). Eucalyptus dumosa A. Cunn. ex Oxley, J. Exped. N. S. Wales 63. 1820.

Common name: white mallee.

Voucher: Australia, 1906, *H. B. Williamson s.n.* (UC-872991).

Native to: New South Wales, South Australia, Victoria.

Mallees or shrubs; bark rough on lower parts of trunk and branches; branchlet pith glandular; branchlets green, orange or red, not glaucous. Leaves alternate, concolorous, lanceolate, dull, entire, > 1.5 cm wide, blue-green to gray-green, older leaves can be glossy. Inflorescences axillary umbels; peduncles slender; buds 7 per umbel, pedicellate, cylindrical, round in cross-section; operculum conical or slightly beaked, operculum scar present. At anthesis, flowers white. Fruits cup-shaped to cylindrical, slightly ribbed; valves enclosed or near rim level.

8 (18). Eucalyptus dundasii Maiden, J. & Proc. Roy. Soc. New South Wales, 1915, 49: 309. 1916.

Common name: Dundas blackbutt.

Voucher: U.S.A. California, *Yost & Ritter 290* (OBI).

Native to: South West Australia.

Trees; bark rough on lower trunk, scaly, blackish, smooth on upper trunk and larger limbs, coppery; branchlet pith glandular. Leaves alternate, concolorous, lanceolate to sickle-shaped. Inflorescences axillary umbels; peduncles slender; buds 7 per umbel; operculum beaked, operculum scar present. At anthesis, flowers white. Fruits cylindrical, sessile; valves enclosed.

9 (21). Eucalyptus dunnii Maiden, Proc. Linn. Soc. New South Wales, ser. 2, 30: 336–338. 1905.

Common name: Dunn's white gum.

Voucher: U.S.A. California, *Yost & Ritter 277* (OBI).

Native to: New South Wales, Southern Queensland.

Trees; bark smooth, not powdery to the touch, usually with some imperfectly shed rough gray bark on the basal area of trunk; branchlet pith without oil glands. Juvenile leaves opposite for more than 10 pairs; adult leaves alternate, concolorous or slightly discolorous, lanceolate, with translucent oil glands. Inflorescences axillary umbels; buds 7 per umbel; operculum conical, operculum scar present. At anthesis, flowers white. Fruits hemispherical; valves exserted.

6 (17′). Eucalyptus elata Dehnh., Cat. Pl. Horti Camald. 26. 1829.

Common name: river peppermint.

Voucher: U.S.A. California, 1900, *J. Burtt Davy s.n.* (UC-40989).

Native to: New South Wales, Victoria. Naturalized: New Zealand, South Africa.

Trees; bark rough on lower trunk only, furrowed, compact, brown-black, smooth on upper trunk and larger limbs, white or cream, shed in ribbons. Leaves alternate, concolorous, lanceolate to sickle-shaped; leaf side veins angling toward leaf margin, not parallel-veined; leaf bases tapering evenly, or almost evenly, to the petiole. Inflorescences axillary umbels; peduncles round in cross-section; buds 11 to 30 or more per umbel, green; operculum scar absent. At anthesis, flowers white. Fruits pedicellate, hemispherical or cup-shaped; valves enclosed.

7 (19). Eucalyptus eremophila (Diels) Maiden, J. & Proc. Roy. Soc. New South Wales 54: 71. 1920.
Basionym: *Eucalyptus occidentalis* var. *eremophila* Diels, Bot. Jahrb. Syst. 35: 442. 1904.

Common name: sand mallet.

Voucher: U.S.A. California, *Yost & Ritter 231* (OBI).

Native to: South West Australia.

Mallees or small trees; lignotuber present or absent; bark smooth; branchlet pith glandular. Leaves alternate, concolorous, lanceolate to ovate, glossy. Inflorescences axillary umbels; peduncles broad, flattened, and straplike, green; buds 7 per umbel, smooth; operculum conical or horn-shaped; all stamens erect when in bud (not bent under operculum), operculum scar present. At anthesis, flowers white, occasionally pink. Fruits down-turned, cup-shaped; valves enclosed or at rim level.

5 (7). Eucalyptus erythrocorys F. Muell., Fragm. 2(12): 33–34. 1860.

Common name: redcap gum or Illyarrie.

Voucher: U.S.A. California, *Ritter 67* (OBI).

Native to: South West Australia.

Mallees or shrubs; bark smooth, gray, brown. Leaves opposite or slightly alternate (subopposite), concolorous, lanceolate to sickle-shaped, petiolate, glossy. Inflorescences axillary umbels; peduncles broad, flattened, and stout; buds 3 per umbel, ridged, with minute sepal teeth; operculum bright red, flattened, ridged with 4 lobes; operculum scar absent. In anthesis, flowers with stamens yellow or chartreuse, in 4 clusters. Fruits $>$ 3 cm wide, 4-lobed; valves enclosed.

5 (13) and 8 (10). Eucalyptus erythronema Turcz., Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg, ser. 2, 10: 337. 1852.

Common name: red-flowered mallee.

Voucher: U.S.A. California, *Ritter 62* (OBI).

Native to: South West Australia.

Mallees, occasionally small trees; bark smooth, pink, brown, burnt red, or white, powdery. Leaves alternate, concolorous, lanceolate, glossy. Inflorescences axillary umbels; buds 3 per umbel, occasionally 7; operculum conical, operculum scar present. At anthesis, flowers red to pale yellow. Fruits down-turned, pedicellate, funnel-shaped; valves near rim level or slightly exserted.

3 (24) and 6 (13). Eucalyptus eugenioides Sieber ex Spreng., Syst. Veg. (ed. 16) 4(2): 195. 1827.

Common name: thin-leaved stringybark.

Voucher: U.S.A. California, 1917, *Hill & Metcalf s.n.* (UC-1569427).

Native to: New South Wales, Southern Queensland, Victoria.

Trees; bark rough, gray-brown, fibrous, fissured. Juvenile leaves alternate, petiolate; adult leaves alternate, concolorous or slightly discolorous, lanceolate to sickle-shaped, thin, > 1 cm wide; leaf side veins angling toward leaf margin, not parallel-veined; leaf bases tapering evenly, or almost evenly to the petiole. Inflorescences axillary umbels; buds 9 to 15 per umbel; operculum conical to beaked, operculum scar absent. At anthesis, flowers white; all stamens with anthers. Fruits cup-shaped; valves at rim level, tips free at maturity.

6 (4). Eucalyptus fastigata H. Deane & Maiden, Proc. Linn. Soc. New South Wales 21: 809. 1897.

Common name: brown barrel.

Voucher: U.S.A. California, *Ritter 345* (OBI).

Native to: New South Wales, Victoria. Naturalized: California, New Zealand, South Africa.

Trees; bark rough to the smaller limbs, gray-brown, fibrous. Leaves alternate, concolorous, lanceolate to sickle-shaped; leaf side veins angling toward leaf margin, sometimes parallel; leaf bases tapering to petiole unevenly (oblique), or occasionally almost evenly to the petiole. Inflorescences paired umbels in leaf axils; buds 11 to 15, or more per umbel; operculum conical or beaked, operculum scar absent. At anthesis, flowers white; all stamens with anthers. Fruits cup-shaped; valves at rim level or slightly exserted.

2 (7). Eucalyptus fibrosa F. Muell., J. Proc. Linn. Soc., Bot. 3: 87. 1859.

Common name: broad-leaved ironbark.

Voucher: U.S.A. California, *Ritter 154* (OBI).

Native to: New South Wales, Queensland.

Trees; bark rough, ironbark type, deeply furrowed, hard, dark brown, gray, or black, retained on trunk and limbs. Leaves alternate, concolorous, lanceolate, dull, gray-green. Inflorescences compound, at branch tips. Operculum conical, 1.5× the length of the hypanthium, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits cup- or barrel-shaped; valves exserted.

8 (13′). Eucalyptus flocktoniae (Maiden) Maiden, J. & Proc. Roy. Soc. New South Wales 49: 316. 1915 [1916].

Common name: merrit.

Voucher: Australia, *C. A. Gardner 1686* (UC).

Native to: South West Australia.

Mallees; bark smooth, cream to coppery; branchlet pith without oil glands; branchlets green, orange, or red, not glaucous. Leaves alternate, concolorous, lanceolate, glossy, entire. Inflorescences axillary umbels; buds 7, 9, or 11 per umbel, pedicellate, slightly ribbed, round in cross-section; operculum beaked to horn-shaped, operculum scar present. At anthesis, flowers white to pale yellow. Fruits urn-shaped to barrel-shaped, slightly ribbed; valves appearing enclosed, but occasionally look exserted due to the delicate remnant style tips at the distal end of the valves.

9 (7). Eucalyptus formanii C. A. Gardner, J. Roy. Soc. Western Australia 27: 186. 1942.

Common name: die hardy mallee.

Voucher: U.S.A. California, *Yost, Ritter & Sanders 301* (OBI).

Native to: South West Australia.

Mallees or shrubs, rarely trees; bark rough, wavy, fibrous, brown or gray; branchlets not glaucous; branchlet pith without oil glands. Leaves alternate, concolorous, linear, < 0.5 cm wide, held erect, glossy. Inflorescences axillary umbels; buds 7 or 9 per umbel, pedicellate; operculum conical or beaked, operculum scar present. At anthesis, flowers white. Fruits pedicellate, cup-shaped; valves exserted.

5 (5′). Eucalyptus forrestiana Diels, Bot. Jahrb. Syst. 35: 439. 1904.

Common name: fuchsia gum.

Voucher: U.S.A. California, *Yost & Ritter 139* (OBI).

Native to: South West Australia.

Small trees or shrubs, lacking a lignotuber; bark smooth, pale gray, shedding in ribbons; branchlet pith without oil glands. Leaves alternate, concolorous, lanceolate, thin, dull. Inflorescences as solitary flowers in leaf axils; peduncles slender; buds bright red, square in cross-section, with 4 wings, pedicellate; operculum flat and disklike, operculum scar present. At anthesis, flowers yellow. Fruits square in cross-section, winged; valves enclosed.

7 (11). Eucalyptus gardneri Maiden, Crit. Rev. Eucalyptus 7(62): 53, pl. 254 (5). 1924.

Common name: blue mallet.

Voucher: Australia, *C. T. White 5287* (UC).

Native to: South West Australia.

Small trees or shrubs, lacking a lignotuber; bark smooth, tan, copper, salmon, brown, shedding in small curls; branchlet pith without oil glands. Leaves alternate, concolorous, lanceolate, dull. Inflorescences axillary umbels; peduncles flattened; buds 9 or 11 per umbel; operculum horn-shaped, 2 to 3× longer

than the hypanthium, operculum scar present. At anthesis, flowers pale yellow. Fruits cylindrical to barrel-shaped; valves near rim level.

5 (28′). Eucalyptus glaucescens Maiden & Blakely, Crit. Rev. Eucalyptus 8: 56. 1929.

Common name: Tingiringi gum.

Voucher: U.S.A. California, *Yost & Ritter 271* (OBI).

Native to: New South Wales, Victoria.

Trees, rarely mallees; bark rough and fibrous on lower trunk, smooth and shedding in ribbons above; branchlets usually glaucous. Juvenile leaves free, not fused at the base; adult leaves alternate, concolorous, lanceolate. Inflorescences axillary umbels; buds 3 per umbel, round in cross-section, glaucous, sessile; operculum smooth, conical, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits sessile, cylindrical or barrel-shaped, 0.8–1.2 cm wide; valves at rim level or enclosed.

5 (2). Eucalyptus globulus Labill., Voy. Rech. Pérouse 1: 153, pl. 13. 1799.

Common name: blue gum, Tasmanian blue gum.

Voucher: U. S. A., California, *Howell 32582* (CAS).

Native to: Tasmania, Victoria. Naturalized: California, Canary Islands, China, Hawaii, India, Jamaica, Peru, Mediterranean Basin, South West Australia, South Africa, Zimbabwe.

Trees; bark smooth usually with imperfectly shed rough bark on the basal area of trunk. Leaves alternate, concolorous, lanceolate and sickle-shaped, dark green. Inflorescences as solitary, glaucous flowers in leaf axils; operculum warty flattened, with a central knob, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits sessile, hemispherical; valves at rim level.

7 (13). Eucalyptus gomphocephala A. Cunn. ex DC., Prod. 3: 220. 1828.

Common name: tuart.

Voucher: U.S.A., California, *Ritter 86* (OBI).

Native to: South West Australia. Naturalized: Hawaii, Mediterranean Basin, South Africa, Victoria.

Trees; bark rough, furrowed, fibrous, flaky, retained on trunk and limbs; branchlet pith glandular. Leaves alternate, concolorous, lanceolate, glossy. Inflorescences axillary umbels; peduncles broad, flattened, green; buds 7 per umbel, shaped like a mushroom; operculum hemispherical, wider than the hypanthium, operculum scar present. At anthesis, flowers white. Fruits funnel-shaped to bell-shaped; valves at rim level or slightly exserted.

8 (19) and 9 (5). Eucalyptus goniocalyx F. Muell. ex Miq., Ned. Kruidk. Arch. 4(1): 134. 1856.

Common name: long-leaved box.

Voucher: U.S.A. California, *Yost & Ritter 151* (OBI).

Native to: New South Wales, South Australia, Victoria.

Trees; bark rough, gray and fibrous, to small branches, occasionally small branches smooth; branchlet pith without oil glands; branches not glaucous. Leaves alternate, concolorous, lanceolate, glossy. Inflorescences axillary umbels; buds 7 per umbel, sessile; operculum conical, operculum scar present. At anthesis, flowers white. Fruits sessile, cylindrical to barrel-shaped; valves near rim level.

8 (14) and 8 (26). Eucalyptus gracilis F. Muell., 1855. Trans. & Proc. Victorian Inst. Advancem. Sci. 1: 35. 1855.

Common name: white mallee.

Voucher: U.S.A. California, *Yost & Ritter 201* (OBI).

Native to: New South Wales, South Australia, South West Australia, Victoria.

Mallees or trees; bark rough, flaky, fibrous on lower branches and trunk, smooth, white, gray, or brown on the smaller limbs; branches not glaucous; branchlet pith without oil glands. Leaves alternate, concolorous, narrowly lanceolate, glossy, entire, with conspicuous black oil dots. Inflorescences axillary umbels; buds 7, 9, or 11 per umbel, round in cross-section, green; operculum rounded or flattened, operculum scar present. At anthesis, flowers white; outer stamens without anthers. Fruits pedicellate, cylindrical to barrel-shaped; valves near rim level.

3 (11). Eucalyptus grandis W. Hill in Anonymous, Cat. Nat. Industr. Prod. Queensland, 25. 1862.

Common name: rose gum.

Voucher: U.S.A. California, *Broder 1472* (CAS).

Native to: New South Wales, Queensland. Naturalized: Arizona, California, Florida, New Zealand, South Australia.

Trees; bark smooth, white, powdery, with a 1–4 m stocking of flaky, gray, rough bark at the base. Leaves alternate, discolorous, lanceolate. Inflorescences axillary umbels; peduncle flattened; buds 7, 9, or 11 per umbel, often glaucous; operculum conical to beaked, operculum scar present. At anthesis, flowers

white. Fruits funnel-shaped, sometimes glaucous; valves 4 or 5, exserted and incurved.

8 (9′). Eucalyptus grossa F. Muell. ex Benth., Fl. Austral. 3: 232. 1867.

Common name: coarse-leaved mallee.

Voucher: U.S.A. California, *Yost & Ritter 356* (OBI).

Native to: South West Australia.

Mallees or shrubs; lignotuber present; bark rough, fibrous; branchlets green; branchlet pith glandular. Leaves alternate, concolorous, lanceolate to ovate, glossy, thick. Inflorescences axillary umbels; peduncle stout, downturned; buds 7 per umbel, round in cross-section, green or red, not glaucous, sessile or nearly so; operculum conical, operculum scar present. At anthesis, flowers yellow. Fruits sessile, cylindrical to barrel-shaped; valves enclosed or at rim level.

1 (15′) and 5 (30′). Eucalyptus gunnii Hook. f., London J. Bot. 3: 499. 1844.

Common name: cider gum.

Voucher: U.S.A. California, *Ritter 66* (OBI).

Native to: Tasmania. Naturalized: Mediterranean Basin, New Zealand.

Trees; bark smooth; branchlets glaucous; crown of mature tree composed of juvenile and adult leaves. Juvenile leaves opposite, glaucous, sessile, entire; adult leaves alternate, concolorous, lanceolate to ovate, dull, blue-green, glaucous, petiolate, entire. Inflorescences axillary umbels; peduncles shorter than buds, erect; buds 3 per umbel, sessile, glaucous or green, round in cross-section; operculum smooth, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits sessile or shortly pedicellate, cylindrical or barrel-shaped, $<$ 1 cm wide, shortly pedicellate; valves at rim level or enclosed.

6 (20). Eucalyptus haemastoma Sm., Trans. Linn. Soc. London 3: 286. 1797.

Common name: scribbly gum.

Voucher: U.S.A. California, *Yost & Ritter 190* (OBI).

Native to: New South Wales.

Trees; bark smooth, with prominent scribbles in the wild, but not usually in cultivation; branchlets smooth, green or brown, not glaucous. Leaves alternate, concolorous, lanceolate to sickle-shaped; leaf side veins angling toward leaf margin, not parallel-veined. Inflorescences axillary umbels; buds 9 to 15 per umbel, round in cross-section; operculum conical, operculum scar absent. At anthesis, flowers white; some outer stamens without anthers. Fruits hemispherical, shortly pedicellate, 0.9 $\times$ 0.9 cm; valves near rim level.

The conspicuous bark scribbles are zigzag tunnels left by larvae of the scribbly gum moth (*Ogmograptis scribula* Meyrick) known from the Australian Capital Territory, New South Wales, and Queensland. Moth scribbles occur in five native *Eucalyptus* species, which include *E. rossii* R. T. Baker & H. G. Sm. and *E. sclerophylla* (Blakely) L. A. S. Johnson & Blaxell, as well as *E. pauciflora* and *E. racemosa* Cav., the latter pair treated herein as naturalized species.

7 (18′) and 8 (6). Eucalyptus incrassata Labill., Nov. Holl. Pl. 2: 2. 1806.

Common name: ridge-fruited mallee.

Voucher: U.S.A. California, *A. C. Sanders 12065* (UC).

Native to: New South Wales, South Australia, South West Australia, Victoria.

Mallees or shrubs; lignotuber present; bark smooth; branchlet pith usually glandular. Leaves alternate, concolorous, lanceolate, glossy, usually with leaf-margin lenticels (Neish et al., 1995) as denticulations along the blade edges. Inflorescences axillary umbels; peduncle flattened, sometimes only slightly so, green; buds 7 per umbel, ribbed; operculum conical to beaked, same width as the hypanthium, operculum scar present. At anthesis, flowers white, occasionally pale yellow, pink, or red. Fruits ribbed; valves enclosed.

4 (16′). Eucalyptus intertexta R. T. Baker, Proc. Linn. Soc. New South Wales 25: 308. 1900.

Common name: gum coolibah.

Voucher: U.S.A. California, *Ritter 94* (OBI).

Native to: North Australia, New South Wales, North West Australia, South Australia, South West Australia, Southern Queensland.

Trees; bark rough, gray, short-fibered, hard, rough bark extending only to base of larger branches, bark of small branches smooth. Leaves alternate, concolorous, lanceolate, dull, blue-green; leaf oil glands and intramarginal leaf veins obscure or absent. Inflorescences compound, at branch tips; buds with operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits cup-shaped, barrel-shaped, or hemispherical; valves enclosed.

5 (18′). Eucalyptus kingsmillii (Maiden) Maiden & Blakely, Crit. Revis. Eucalyptus 8: 43. 1929.
Basionym: *Eucalyptus pyriformis* var. *kingsmillii*

Maiden, J. & Proc. Roy. Soc. New South Wales 52: 508. 1919.

Common name: Kingsmill's mallee.

Voucher: Australia, July 1918, *W. Kingsmill s.n.* (isotype, UC-437558).

Native to: North West Australia, South West Australia.

Mallees or shrubs; lignotuber present; bark rough at the base and smooth above, or sometimes completely smooth; branchlet piths without oil glands. Leaves alternate, concolorous, lanceolate, dull. Inflorescences unbranched, pendulous, umbels in leaf axils; peduncles slender; buds 3 per umbel, pedicellate, distinctly ribbed; operculum conical to beaked, ribbed, operculum scar present. At anthesis, flowers white. Fruits hemispherical, with > 5 prominent ridges; disk of fruit raised; valves exserted.

8 (13) and 8 (20). Eucalyptus kitsoniana Maiden, Crit. Rev. Eucalyptus 3: 164. 1916.

Common name: Gippsland mallee.

Voucher: U.S.A. California, *Yost & Ritter 263* (OBI).

Native to: Victoria. Naturalized: California.

Mallees or trees; bark smooth, coppery, shedding in ribbons; branchlet pith without oil glands; branchlets green, orange, or red, not glaucous. Leaves alternate, concolorous, lanceolate, glossy, entire. Inflorescences axillary umbels, often subtended by a prominent bract; buds 7 per umbel, sessile, round in cross-section, green; operculum rounded or conical, operculum scar present. At anthesis, flowers white. Fruits cup-shaped, sessile; valves enclosed or near rim level.

1 (9). Eucalyptus kruseana F. Muell., Australas. J. Pharm. 10: 233. 1895.

Common name: bookleaf mallee.

Voucher: U.S.A. California, *Yost & Ritter 308* (OBI).

Native to: South West Australia.

Mallees or shrubs; lignotuber present; bark rough at the base and smooth above; branchlets glaucous, round in cross-section; branchlet pith glandular; crown of mature tree composed primarily of juvenile leaves. Crown leaves alternate, or nearly opposite, concolorous, sessile, not fused, orbicular or heart-shaped, wrapping around the stem. Inflorescences axillary umbels; buds 7 per umbel, glaucous; operculum smooth, conical, operculum scar present. At anthesis, flowers yellow to chartreuse. Fruits barrel-shaped, < 0.75 cm wide; valves at rim level.

4 (6). Eucalyptus lansdowneana F. Muell. & J. E. Br., For. Fl. S. Australia 9, t. 31. 1890.

Common name: red-flowered mallee box.

Voucher: U.S.A. California, *Yost & Ritter 297* (OBI).

Native to: South Australia.

Mallees or shrubs; bark rough, gray, fibrous, smooth, and coppery on smaller limbs. Leaves alternate, concolorous, lanceolate. Inflorescences compound, at branch tips; buds with operculum conical or rounded, operculum scar absent. At anthesis, flowers red to mauve to pink. Fruits barrel-shaped; valves enclosed.

4 (15′). Eucalyptus largiflorens F. Muell., Trans. & Proc. Victorian Inst. Advancem. Sci. 1: 34. 1855.

Common name: black box.

Voucher: U.S.A. California, 1912, *F. Walter s.n.* (UC-170420).

Native to: New South Wales, Southern Queensland, South Australia, Victoria.

Trees; bark gray, short-fibered, hard, rough to the smallest branches. Leaves alternate, concolorous, lanceolate. Inflorescences compound, at branch tips; buds with operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits cup- or barrel-shaped, glaucous; valves enclosed.

7 (6′). Eucalyptus lehmannii (Schauer) Benth., Fl. Austral. 3: 233. 1867. Basionym: *Symphyomyrtus lehmannii* Schauer in Lehm., Pl. Preiss. 1(1): 127. 1844.

Common name: bushy yate.

Voucher: U.S.A. California, *Ritter 21* (OBI).

Native to: South West Australia.

Trees or mallees; lignotuber present; bark smooth, white and gray; branchlet pith without oil glands; apical bud < 1 cm long, not triangular. Leaves alternate, concolorous, elliptical. Inflorescences axillary umbels; peduncles broad, flattened, and strap-like; buds more than 7 per umbel, fused at the base; operculum slender, horn-shaped; operculum scar present but hard to see. At anthesis, flowers chartreuse. Fruits fused at the base into a woody mass up to 4 cm wide; valves exserted, tips connected at maturity.

Plants often known and sold as *Eucalyptus lehmannii* are actually *E. conferruminata*.

8 (28′). Eucalyptus lesouefii Maiden, Crit. Rev. Eucalyptus 2: 187. 1912.

Common name: Goldfields' blackbutt.

Voucher: U.S.A. California, 1911, *Mrs. Cleland s.n.* (UC-194860).

Native to: South West Australia.

Trees; bark rough, flaky, dark, fibrous on lower trunk, smooth, brown or coppery above; branches often glaucous; branchlet pith glandular. Leaves alternate, concolorous, narrowly lanceolate. Inflorescences axillary umbels; buds 7 per umbel, diamond-shaped, with prominent ribs, glaucous; operculum conical, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits pedicellate, cup-shaped, ribbed, glaucous; valves near rim level.

5 (20). Eucalyptus leucoxylon F. Muell., Trans. & Proc. Victorian Inst. Advancem. Sci. 1: 33–34. 1855.

Common name: white ironbark.

Voucher: U.S.A. California, *Landrum 10965* (OBI).

Native to: New South Wales, South Australia, Victoria. Naturalized: New Zealand, South Africa.

Trees; bark smooth, white, sometimes with incompletely shed, shaggy bark at the base. Leaves alternate, concolorous, lanceolate. Inflorescences axillary umbels; buds 3 per umbel; operculum beaked, operculum scar absent. At anthesis, flowers white, red, pink, yellow, or occasionally orange; outer stamens without anthers. Fruits pedicellate, cup- or barrel-shaped; valves enclosed.

5 (19). Eucalyptus longifolia Link, Enum. Hort. Berol. Alt. 2: 29. 1822.

Common name: woollybutt.

Voucher: U.S.A. California, *Ritter 51* (OBI).

Native to: New South Wales. Naturalized: California, South Africa.

Trees; bark rough, furrowed, retained on trunk and limbs. Leaves alternate, concolorous, lanceolate to sickle-shaped. Inflorescences unbranched, pendulous, umbels, in leaf axils; buds 3 per umbel; operculum conical, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits pedicellate, cup-shaped; valves near rim level.

8 (9) and 8 (27). Eucalyptus loxophleba Benth., Fl. Austral. 3: 252. 1867.

Common name: York gum.

Voucher: U.S.A. California, *Yost & Ritter 323* (OBI).

Native to: South West Australia.

Trees or mallees; bark rough to the smallest branches; branchlet pith glandular. Leaves alternate, concolorous, lanceolate to sickle-shaped, glossy. Inflorescences axillary umbels; peduncle slender, upright; buds 7, 9, or 11 per umbel, pedicellate, round in cross-section, green; operculum rounded, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits pedicellate, funnel-shaped; valves enclosed.

9 (10). Eucalyptus macarthurii H. Deane & Maiden, Proc. Linn. Soc. New South Wales, ser. 2, 24: 448. 1899.

Common name: Paddy's River box.

Voucher: U.S.A. California, *Ritter 232* (OBI).

Native to: New South Wales. Naturalized: California, New Zealand, South Africa.

Trees; bark rough, loosely fibrous, fissured, brown or gray, shed as ribbons from the upper limbs; branches not glaucous. Leaves alternate, concolorous, lanceolate. Inflorescences axillary umbels; buds 7 per umbel, shortly pedicellate, occasionally sessile, operculum conical to beaked, operculum scar present. At anthesis, flowers white. Fruits sessile or pedicellate, funnel- or bell-shaped; disk of fruit flat or slightly raised, not prominent; valves exserted just beyond rim level.

7 (16). Eucalyptus macrandra F. Muell. ex Benth., Fl. Austral. 3: 235. 1867.

Common name: river yate.

Voucher: U.S.A. California, *Ritter 19* (OBI).

Native to: South West Australia.

Mallees or shrubs; lignotuber present; bark smooth, coppery, gray, salmon; branchlet pith glandular. Leaves alternate, concolorous, lanceolate, glossy. Inflorescences axillary umbels; peduncles broad, flattened, and straplike, green; buds 11 or more per umbel; operculum horn-shaped, operculum scar present. At anthesis, flowers yellow. Fruits cup- or barrel-shaped; valves at rim level, tips free.

1 (11′). Eucalyptus macrocarpa Hook., Icon. Pl. 5: t. 405–407. 1841.

Common name: mottlecah.

Voucher: U.S.A. California, *Yost & Ritter 378* (OBI).

Native to: South West Australia.

Mallees or shrubs; bark smooth, shedding in ribbons; branchlets glaucous, round in cross-section; crown of mature tree composed primarily of juvenile leaves. Crown leaves opposite, concolorous, sessile, orbicular or heart-shaped, wrapping around the stem, not fused. Inflorescences solitary, glaucous, in leaf axils; peduncle stout; buds sessile or nearly so, spherical, glaucous; operculum smooth, conical,

beaked, operculum scar present. At anthesis, flowers red. Fruits sessile, saucer- to funnel-shaped; valves exserted.

7 (2). Eucalyptus maidenii (F. Muell.) Kirkpatr., Proc. Linn. Soc. New South Wales, ser. 2, 4: 1020, pl. 28, 29. 1890.

Common name: Maiden's gum.

Voucher: U.S.A. California, *Yost & Ritter 214* (OBI).

Native to: New South Wales, Victoria.

Trees; bark smooth, usually with imperfectly shed rough bark on the basal area of trunk. Leaves alternate, concolorous, lanceolate and sickle-shaped, dark green. Inflorescences axillary umbels; peduncle stout, angled; buds 7 per umbel, sessile, glaucous; operculum warty, flattened, with a central knob, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits sessile, funnel-shaped; valves exserted.

9 (8′). Eucalyptus mannensis Boomsma, Trans. & Proc. Roy. Soc. South Australia 88: 115. 1964.

Common name: Mann Range mallee.

Voucher: Australia, 33 km N of Angas Downs Homestead, Northern Territory, 15 Oct. 1957, *G. M. Chippendale & L. A. S. Johnson 3986* (type, AD, not seen).

Native to: South West Australia, North Australia, South Australia.

Mallees or shrubs; lignotuber present; bark rough, fibrous, brown or gray; branchlets not glaucous; branchlet pith without oil glands. Leaves alternate, concolorous, narrowly lanceolate, > 0.75 cm wide, glossy. Inflorescences axillary umbels; buds 7, 9, or 11 per umbel, pedicellate; operculum conical to rounded, operculum scar present. At anthesis, flowers white. Fruits pedicellate, hemispherical; valves exserted.

9 (19). Eucalyptus mannifera Mudie, Trans. Med. Bot. Soc. 1(3): 24. 1834.

Common name: brittle gum or red spotted gum.

Voucher: U.S.A. California, *Ritter 226* (OBI).

Native to: New South Wales, Victoria. Naturalized: California.

Trees; bark smooth, powdery to the touch, white, gray, mottled; branchlet pith without oil glands. Leaves alternate, concolorous, lanceolate, narrowly lanceolate, sickle-shaped, dull, bluish green. Inflorescences axillary umbels; buds 7 per umbel; operculum conical to beaked, operculum scar present. At anthesis, flowers white. Fruits hemispherical; valves exserted.

3 (25). Eucalyptus marginata Donn ex Sm., Trans. Linn. Soc. London 6: 302. 1802.

Common name: jarrah.

Voucher: U.S.A. California, 1896, *J. H. Barber s.n.* (UC-41048).

Native to: South West Australia. Naturalized: Hawaii, South Africa.

Trees; bark rough, fibrous. Leaves alternate, discolorous, distinctly lighter on the underside, leathery, lanceolate to sickle-shaped. Inflorescences axillary umbels; peduncles slender, round in cross-section; buds 7 to 13 per umbel, green; operculum conical to horn-shaped, operculum scar absent. At anthesis, flowers white; outer stamens erect under operculum when in bud, all stamens with anthers. Fruits > 1 cm wide, globe- to barrel-shaped; valves at rim level or enclosed, tips free at maturity.

7 (7′). Eucalyptus megacornuta C. A. Gardner, J. Roy. Soc. Western Australia 27: 184. 1942.

Common name: warted yate.

Voucher: U.S.A. California, *Yost & Ritter 193* (OBI).

Native to: South West Australia.

Small trees or shrubs, lacking a lignotuber; bark smooth; branchlet pith without oil glands. Leaves alternate, concolorous, lanceolate, glossy. Inflorescences axillary umbels; peduncles broad, flattened, and straplike; buds 3 or 7 per umbel, free at the base, green; operculum warty, operculum scar present. At anthesis, flowers yellow to chartreuse. Fruits sessile, free at the base, funnel- to bell-shaped, valves exserted, tips connected at maturity.

1 (3) and 2 (1). Eucalyptus melanophloia F. Muell., J. Proc. Linn. Soc., Bot. 3: 93. 1859.

Common name: silver-leaved ironbark.

Voucher: U.S.A. California, *Yost & Ritter 173* (OBI).

Native to: North Australia, New South Wales, Queensland.

Trees; bark rough, ironbark type, deeply furrowed, hard, dark brown, gray, or black, retained on trunk and limbs; crown of mature tree composed primarily of juvenile leaves. Juvenile leaves opposite, sessile, ovate, concolorous, glaucous, gray-green. Inflorescences compound, at branch tips; buds with operculum conical, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits cup-shaped, glaucous; valves exserted.

6 (2) and 8 (26′). Eucalyptus melliodora Schauer in Walp., Repert. Bot. Syst. 2(5): 924. 1843.

Common name: honey box.

Voucher: U.S.A. California, *Yost & Ritter 242* (OBI).

Native to: New South Wales, Southern Queensland, Victoria.

Trees; bark rough, fibrous on lower branches and trunk, sometimes rough over the entire trunk, sometimes smooth on the smaller limbs, yellow-brown; branches not glaucous; branchlet pith without oil glands. Leaves alternate, concolorous, narrowly lanceolate to lanceolate, dull, entire. Inflorescences axillary umbels; buds 7 per umbel, round in cross-section, green; operculum rounded or conical, operculum scar absent. At anthesis, flowers white; outer stamens without anthers. Fruits pedicellate, hemispherical; valves enclosed or near rim level.

4 (11′). Eucalyptus microcarpa (Maiden) Maiden, Crit. Rev. Eucalyptus 6(8): 438. 1923. Basionym: *Eucalyptus hemiphloia* var. *microcarpa* Maiden, Trans. & Proc. Roy. Soc. South Australia 26: 11. 1902.

Common name: inland box.

Voucher: Australia, 1917, *J. L. Boorman s.n.* (UC-437482).

Native to: New South Wales, South Australia, Southern Queensland, Victoria.

Trees; bark rough, gray, short-fibered, hard. Leaves alternate, concolorous, lanceolate. Inflorescences compound, at branch tips; buds green, straight; operculum scar absent. Flowers white; all stamens with anthers. Fruits cylindrical or barrel-shaped; valves enclosed or near the fruit rim.

3 (14′). Eucalyptus microcorys F. Muell., Fragm. 2(12): 50. 1860.

Common name: tallowwood.

Voucher: U.S.A. California, *Yost & Ritter 292* (OBI).

Native to: New South Wales, Southern Queensland. Naturalized: Hawaii, South Africa, Sri Lanka, South West Australia, Zimbabwe.

Trees; bark rough, thick, fibrous. Leaves alternate, discolorous, lanceolate. Inflorescences compound, at branch tips; buds club-shaped; operculum scar present. At anthesis, flowers white; stamens in 4 clusters, outer ones without anthers. Fruits funnel-shaped; valves slightly exserted or at rim level.

4 (16). Eucalyptus microtheca F. Muell., J. Proc. Linn. Soc., Bot. 3: 87. 1859.

Common name: tropical coolibah.

Voucher: U.S.A. California, *L. R. Landrum 11295* (OBI).

Native to: North Australia, North West Australia, Queensland. Naturalized: Arizona.

Trees; bark rough, light gray, short-fibered, hard, fissured, rough bark extending only to base of larger branches, bark of small branches smooth. Leaves alternate, concolorous, lanceolate; oil glands obvious; intramarginal leaf vein present. Inflorescences compound, at branch tips; buds with operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits globose to funnel-shaped, sometimes glaucous; valves slightly exserted or at rim level.

3 (21). Eucalyptus miniata Schauer in Walp., Repert. Bot. Syst. 2: 925. 1843.

Common name: Darwin woollybutt.

Voucher: Australia, *L. A. Craven 4058* (UC).

Native to: North Australia, Northern Queensland, North West Australia.

Trees; bark rough, papery, fibrous, brown on most of the trunk; upper trunk and branches with smooth, white bark; branchlets glaucous. Leaves alternate, discolorous, broadly lanceolate. Inflorescences axillary umbels; buds 7 per umbel, glaucous, ribbed; operculum rounded or conical, operculum scar present. At anthesis, flowers orange; all stamens with anthers. Fruits cylindrical or barrel-shaped, sessile or nearly so, glaucous; valves enclosed, tips free at maturity.

5 (10). Eucalyptus morrisii R. T. Baker, Proc. Linn. Soc. New South Wales 25: 312. 1900.

Common name: gray mallee.

Voucher: U.S.A. California, *Yost & Ritter 327* (OBI).

Native to: New South Wales.

Mallees, occasional trees; bark rough, fibrous, gray. Leaves alternate, concolorous, lanceolate. Inflorescences axillary umbels; buds usually 3 per umbel, green; operculum conical, smooth, green, operculum scar present. At anthesis, flowers white. Fruits globose; disk of fruit raised and convex; valves strongly exserted.

3 (24′) and 6 (13′). Eucalyptus muelleriana A. W. Howitt, Trans. Roy. Soc. Victoria 2(1): 89–91. 1890 [Apr. 1891].

Common name: yellow stringybark.

Voucher: U.S.A. California, 1927, *H. B. Williamson s.n.* (UC-873004).

Native to: New South Wales, Victoria. Naturalized: New Zealand, South Africa, South West Australia.

Trees; bark rough, fibrous, brown. Juvenile leaves alternate, petiolate; adult leaves alternate, slightly discolorous or concolorous, lanceolate, leathery, > 1 cm wide; leaf side veins angling toward leaf margin, not parallel-veined; leaf bases tapering evenly, or almost evenly to the petiole. Inflorescences axillary umbels; buds 7, 9, or 11 per umbel; operculum rounded, operculum scar absent. Flowers white; all stamens with anthers. Fruits pedicellate; valves at rim level or slightly exserted, tips free at maturity.

1 (7′) and 1 (18). Eucalyptus neglecta Maiden, Vict. Naturalist 21: 114. 1904.

Common name: Omeo gum.

Voucher: U.S.A. California, *Yost & Ritter 156* (OBI).

Native to: Victoria.

Trees or mallees; bark rough, brown, fibrous; young stems square in cross-section; crown of mature tree composed primarily of juvenile and intermediate leaves, with occasional adult leaves. Juvenile leaves opposite or alternate, sessile, entire, not fused, ovate, glaucous, base wrapping around stem; intermediate and adult leaves opposite or alternate, entire, pedicellate, glaucous, ovate to lanceolate. Inflorescences axillary umbels; buds 7 to 15 per umbel, oval, sessile, glaucous. At anthesis, flowers white. Fruits sessile, cup-shaped; valves exserted or near rim level.

9 (14). Eucalyptus nicholii Maiden & Blakely, Crit. Rev. Eucalyptus 8: 52. 1929.

Common name: narrow-leaved black peppermint.

Voucher: U.S.A. California, *Ritter 27* (OBI).

Native to: New South Wales.

Trees; bark rough, brown, fibrous to the smallest branches, not shedding in ribbons from smaller branches. Juvenile leaves green or grayish green, linear to narrowly lanceolate, sessile or shortly petioled, entire; adult leaves alternate, concolorous, narrowly lanceolate. Inflorescences axillary umbels; buds 7 per umbel; operculum scar present. At anthesis, flowers white. Fruits pedicellate, hemispherical; disk of fruit thin, slightly ascending; valves exserted.

8 (20′). Eucalyptus nitens (H. Deane & Maiden) Maiden, Crit. Rev. Eucalyptus 2: 273. 1913. Basionym: *Eucalyptus goniocalyx* var. *nitens* H. Deane & Maiden, Proc. Linn. Soc. New South Wales 24: 462. 1899.

Common name: silvertop.

Voucher: U.S.A. California, *Yost & Ritter 227* (OBI).

Native to: New South Wales, Victoria. Naturalized: New Zealand, South Africa.

Trees; bark smooth, pale gray or cream, occasionally with a rough stocking at the base, shed in ribbons from upper branches; branchlet pith without oil glands; branchlets green, orange or red, not glaucous. Leaves alternate, concolorous, lanceolate to sickle-shaped, glossy. Inflorescences axillary umbels; buds 7 per umbel, sessile, round in cross-section, green; operculum conical, operculum scar present. At anthesis, flowers white. Fruits cup- to barrel-shaped, sessile; valves enclosed or near rim level.

7 (21′). Eucalyptus nutans F. Muell., Fragm. 3(23): 152. 1863.

Common name: red-flowered moort.

Voucher: U.S.A. California, *Yost & Ritter 288* (OBI).

Native to: South West Australia.

Small trees or shrubs, lacking a lignotuber; bark smooth, shiny, gray; branchlet pith glandular. Leaves alternate, concolorous, ovate to elliptical, glossy. Inflorescences axillary umbels; peduncles broad, flattened, and straplike; buds 7 per umbel, ridged or winged, sessile; horn-shaped, smooth, narrower than and same length as the hypanthium, operculum scar present. At anthesis, flowers red; all stamens erect when in bud (not bent under operculum). Fruits sessile, with narrow longitudinal ridges; valves 5 or 6, enclosed.

6 (10). Eucalyptus obliqua L'Hér., Sert. Angl. 18. 1788 [1789].

Common name: messmate stringybark.

Voucher: U.S.A. California, *Ritter 118* (OBI).

Native to: New South Wales, South Australia, Southern Queensland, Tasmania, Victoria. Naturalized: New Zealand, South Africa.

Trees; bark rough, fibrous, brown. Juvenile leaves pendulous, usually > 6 cm wide, glossy, green, petiolate; adult leaves alternate, concolorous, lanceolate, > 1 cm wide; leaf side veins angling toward leaf margin, not parallel-veined; leaf bases oblique. Inflorescences axillary umbels; buds 11 to 15 or more per umbel; operculum conical to rounded, operculum scar absent. At anthesis, flowers white; all stamens with anthers. Fruits pedicellate; cup- or barrel-shaped, valves at rim level or enclosed.

7 (9). Eucalyptus occidentalis Endl., Enum. Pl. 49. 1837.

Common name: flat-topped yate.

Voucher: U.S.A. California, 1896, *J. H. Barber s.n.* (UC-41063).

Native to: South West Australia. Naturalized: South Africa, Victoria.

Trees; lignotuber present; bark rough at the base, fibrous, black to gray, smooth bark on upper limbs shedding in strips leaving smooth white or gray bark; branchlet pith glandular. Leaves alternate, concolorous, lanceolate, glossy. Inflorescences unbranched, pendulous umbels, in leaf axils; peduncles broad, flattened; buds 7, 9, 11, or 13 per umbel; operculum 1.5 to 2.5× longer than the hypanthium, operculum scar present. At anthesis, flowers cream to pale yellow. Fruits bell-shaped; valves exserted, tips free at maturity.

4 (11). Eucalyptus ochrophloia F. Muell., Fragm. 11(89): 36–37. 1878.

Common name: napunyah.

Voucher: U.S.A. California, *Yost & Ritter 377* (OBI).

Native to: New South Wales, Southern Queensland.

Trees; bark rough, scaly, gray to black, short-fibered, hard on trunk, smooth, coppery on upper limbs and branches. Leaves alternate, concolorous, lanceolate, glossy. Inflorescences compound, at branch tips; buds often curved, spindle-shaped; operculum scar absent. At anthesis, flowers white; outer stamens without anthers. Fruits cylindrical to barrel-shaped; valves enclosed.

9 (8). Eucalyptus oleosa F. Muell. ex Miq., Ned. Kruidk. Arch. 4(1): 127. 1856.

Common name: red morrell.

Voucher: U.S.A. California, *Yost & Ritter 317* (OBI).

Native to: New South Wales, South Australia, South West Australia, Victoria.

Mallees or shrubs; lignotuber present; bark rough, fibrous, flaky, brown or gray; branchlets not glaucous; branchlet pith without oil glands. Leaves alternate, concolorous, lanceolate to narrowly lanceolate, > 0.75 cm wide, glossy. Inflorescences axillary umbels; buds 7, 9, or 11 per umbel, pedicellate; operculum rounded, operculum scar present. At anthesis, flowers white. Fruits pedicellate, hemispherical; valves exserted, needle-like and fragile.

6 (15). Eucalyptus olsenii L. A. S. Johnson & Blaxell, Telopea 1: 395. 1980.

Common name: Olsen's gum or Woila gum.

Voucher: Australia, New South Wales, Dampier trig., E of Big Badja Hill, 13 June 1972, *H. Fairlie-Cuninghame s.n.* (type, NSW, not seen).

Native to: New South Wales.

Trees; bark smooth, white to gray, rough on lower trunk, fibrous, flaky, gray to brown. Leaves alternate, concolorous, lanceolate; leaf side veins angling toward leaf margin, not parallel-veined. Inflorescences axillary umbels; buds 7 per umbel, ribbed, scaly; operculum beaked, operculum scar absent. At anthesis, flowers white; all stamens with anthers. Fruits sessile or pedicel < 0.4 cm long; valves enclosed.

9 (2). Eucalyptus orbifolia F. Muell., Fragm. 5(33): 50. 1865.

Common name: round-leaved mallee.

Voucher: U.S.A. California, *Yost & Ritter 142* (OBI).

Native to: South West Australia.

Mallees or shrubs; lignotuber present; bark rough and flaky on larger branches, otherwise peeling and rolling in thin vertical strips, reddish brown; branchlets glaucous. Leaves alternate, concolorous, ovate to elliptical. Inflorescences axillary umbels; buds 7 (occasionally 3) per umbel, glaucous, globular; operculum, rounded to conical, operculum scar present. At anthesis, flowers yellow to cream. Fruits pedicellate, glaucous, hemispherical, globose to funnel-shaped; valves exserted.

9 (20). Eucalyptus ovata Labill., Nov. Holl. Pl. 2: 13. 1806.

Common name: black gum or swamp gum.

Voucher: U.S.A. California, *Huber 1203* (CAS).

Native to: New South Wales, South Australia, Tasmania, Victoria. Naturalized: California, New Zealand.

Trees; bark smooth, usually not powdery to the touch, usually with some imperfectly shed rough gray bark on the basal area of trunk; branchlet pith without oil glands. Juvenile leaves opposite for fewer than 5 pairs; adult leaves alternate, concolorous, lanceolate, broadly lanceolate to ovate, often with wavy or undulate margins. Inflorescences axillary umbels; buds 7 per umbel, pedicellate, green; operculum conical, operculum scar present. At anthesis, flowers white. Fruits funnel-shaped; valves at rim level or slightly exserted.

2 (3). Eucalyptus paniculata Sm., Trans. Linn. Soc. London 3: 287–288. 1797.

Common name: gray ironbark.

Voucher: U.S.A. California, *Ritter 104* (OBI).

Native to: New South Wales. Naturalized: Hawaii, South Africa, Zimbabwe.

Trees; bark rough, ironbark type, deeply furrowed, hard, dark brown, gray, or black, retained on trunk and limbs. Leaves alternate, discolorous, lanceolate, dull, gray-green. Inflorescences compound, at branch tips; buds with operculum conical, operculum scar present. At anthesis, flowers white; outer stamens without anthers. Fruits cup- to funnel-shaped; valves enclosed.

8 (17). Eucalyptus parvula L. A. S. Johnson & K. D. Hill, Telopea 4(2): 233. 1991.

Common name: small-leaved gum.

Voucher: U.S.A. California, *McClintock s.n.* (CAS-474279).

Native to: New South Wales. Naturalized: California.

Trees; bark smooth, gray, shedding in ribbons, usually with some imperfectly shed rough gray bark on the basal area of trunk; branchlet pith without oil glands; branchlets green, orange, or red, not glaucous; crown of mature trees usually with juvenile, intermediate, and adult leaves. Crown leaves alternate or opposite, concolorous, elliptical, ovate to lanceolate. Inflorescences axillary umbels; buds 7 per umbel, sessile, round in cross-section, green; operculum conical, operculum scar present. At anthesis, flowers white. Fruits cup-shaped, sessile; valves enclosed or near rim level.

6 (6). Eucalyptus pauciflora Sieber ex Spreng., Syst. Veg. (ed. 16) 4(2): 195. 1827.

Common name: snow gum.

Voucher: U.S.A. California, *Yost & Ritter 182* (OBI).

Native to: New South Wales, South Australia, Southern Queensland, Tasmania, Victoria.

Trees; bark smooth, white, cream, and gray; branchlets sometimes glaucous. Leaves alternate, concolorous, lanceolate, glossy; leaf side veins parallel or nearly parallel. Inflorescences axillary umbels; buds 9 to 15 per umbel, club-shaped, rounded, sometimes warty; operculum conical and beaked, operculum scar absent. At anthesis, flowers white; all stamens with anthers. Fruits sessile or nearly so, hemispherical, sometimes glaucous; valves at rim level or enclosed.

3 (20). Eucalyptus pellita F. Muell., Fragm. 4(30): 159–160. 1864 [Sep. 1863–Nov. 1864].

Common name: large-fruited red mahogany.

Voucher: U.S.A. California, *Ritter 112* (OBI).

Native to: Northern Queensland.

Trees; bark rough, thick, fibrous, reddish brown. Leaves alternate, discolorous, broadly lanceolate. Inflorescences as axillary umbels; buds 7 or more per umbel; operculum conical, slightly beaked, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits pedicellate, cup- to funnel-shaped, with a broad ring on top, > 1.4 cm wide; disk of fruit flat; valves exserted, tips free at maturity.

1 (2) and 5 (28). Eucalyptus perriniana F. Muell. ex Rodway, Pap. & Proc. Roy. Soc. Tasmania 1893: 181. 1894. TYPE: Tasmania. N of Hamilton, May 1892, *L. Rodway s.n.* (lectotype, designated by Bean [2010: 519], HO-16178).

Common name: spinning gum.

Voucher: U.S.A. California, *Yost & Ritter 228* (OBI).

Native to: New South Wales, Tasmania, Victoria.

Trees; bark smooth, gray, white, shedding in ribbons; branchlets glaucous; crown of mature trees with juvenile and adult leaves. Juvenile leaves opposite, glaucous, fused at the base forming a ring; adult leaves alternate or opposite, concolorous, ovate to broadly lanceolate, glaucous. Inflorescences axillary umbels; buds 3 per umbel, round in cross-section, glaucous, sessile or pedicel < 0.2 cm; operculum smooth, rounded and slightly beaked, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits sessile or shortly pedicellate, cylindrical or cup-shaped, glaucous, 0.5–0.8 cm wide; valves at rim level.

6 (16). Eucalyptus pilularis Sm., Trans. Linn. Soc. London 2: 284. 1797.

Common name: blackbutt.

Voucher: U.S.A. California, *Forestry Sta. Santa Monica s.n.* (UC-1569450).

Native to: New South Wales, Southern Queensland. Naturalized: Hawaii, New Zealand, South Africa.

Trees; bark rough on lower trunk, finely fibrous, gray or brown, smooth on upper trunk and larger limbs, white or cream. Leaves alternate, concolorous, lanceolate to sickle-shaped; leaf side veins angling toward leaf margin, not parallel-veined. Inflorescences axillary umbels; peduncles flattened; buds 7 to 15 per umbel; operculum conical and beaked, operculum scar absent. In anthesis, flowers white; all stamens with anthers. Fruits pedicellate, hemispherical to globose; valves at rim level or enclosed.

7 (21). Eucalyptus platypus Hook., Hooker's Icon. Pl. 9: tab. 849. 1852.

Common name: moort.

Voucher: U.S.A. California, *Yost & Ritter 286* (OBI).

Native to: South West Australia. Naturalized: California, South Africa.

Small trees or shrubs, lacking a lignotuber; bark smooth, gray to coppery; branchlet pith glandular. Leaves alternate, concolorous, orbicular to elliptical, glossy. Inflorescences axillary umbels; peduncles broad, flattened, and straplike, green; buds 7 per umbel, ridged or winged; operculum horn-shaped, 1.5 to 3× longer than the hypanthium, operculum scar present. At anthesis, flowers yellow; all stamens erect when in bud (not bent under operculum). Fruits sessile, with narrow longitudinal ridges; valves 4, enclosed.

1 (7). Eucalyptus pleurocarpa Schauer in Lehm., Pl. Preiss. 1(1): 132. 1844–1845 [1844].

Common name: tallerack.

Voucher: U.S.A. California, *Yost & Ritter 191* (OBI).

Native to: South West Australia.

Mallees; bark smooth, gray; branchlets glaucous, pith glandular; stems square in cross-section. Crown leaves opposite or nearly opposite, petiolate, entire, not fused, ovate to elliptical, glaucous. Inflorescences axillary umbels; peduncles flattened; buds 3 per umbel, pedicellate, 4-angled, glaucous. At anthesis, flowers white to cream. Fruits pedicellate, barrel-shaped, glaucous; valves enclosed.

Cultivated material is often sold as *Eucalyptus tetragona* (R. Br.) F. Muell., a misapplied name.

4 (2) and 4 (13′). Eucalyptus polyanthemos Schauer in Walp., Repert. Bot. Syst. 2(5): 924. 1843.

Common name: red box or silver dollar gum.

Voucher: U.S.A. California, *Twisselmann 18559* (CAS).

Native to: New South Wales, Victoria.

Trees; bark rough, gray, flaky, and fibrous on the lower trunk or smooth, gray, white, and smooth on upper branches; branchlets occasionally glaucous; crown of mature tree with occasional juvenile and intermediate leaves. Crown leaves alternate, concolorous, ovate to lanceolate, petiolate, dull, blue-green, gray-green, or glaucous. Inflorescences compound, at branch tips. Operculum scar present. At anthesis, flowers white; outer stamens without anthers; stamens shed together in a ring. Fruits urn- or barrel-shaped, glaucous; valves enclosed.

8 (15′). Eucalyptus polybractea F. Muell. ex R. T. Baker, Proc. Linn. Soc. New South Wales 25: 692–693, tab. xlvi, figs. 7–8. 1901.

Common name: blue-leaved mallee.

Voucher: U.S.A. California, *Yost & Ritter 212* (OBI).

Native to: New South Wales, South Australia, Victoria.

Mallees; bark rough, gray, short-fibered, hard; branchlet pith without oil glands. Leaves alternate, concolorous, lanceolate, dull, bluish gray or bluish green, entire. Inflorescences axillary umbels; buds 7, 9, or 11 per umbel, round in cross-section, green; operculum rounded or conical, operculum scar absent. At anthesis, flowers white; all stamens with anthers. Fruits pedicellate, cylindrical to barrel-shaped; valves enclosed or near rim level.

4 (15). Eucalyptus populnea F. Muell., J. Proc. Linn. Soc., Bot. 3: 93. 1859 [1858].

Common name: Bimbil box.

Voucher: Australia, *F. M. Reed 3758* (UC).

Native to: New South Wales, Queensland.

Trees; bark rough, gray, short-fibered, hard, rough to the smallest branches; crown of mature tree with occasional intermediate leaves. Crown leaves alternate, concolorous, orbicular to ovate, glossy, green, thick, with long slender petioles. Inflorescences compound, at branch tips. Operculum rounded, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits cup-shaped; valves enclosed or near rim level.

5 (12). Eucalyptus preissiana Schauer in Lehm., Pl. Preiss. 1(1): 131–132. 1844.

Common name: bell-fruited mallee.

Voucher: U.S.A. California, *Ritter 129* (OBI).

Native to: South West Australia.

Mallees or shrubs; lignotuber present; bark smooth, gray. Leaves alternate or occasionally opposite, concolorous, broadly lanceolate, thick, dull, bluish green. Inflorescences as axillary umbels; peduncles broadly flattened; buds 3 per umbel; operculum rounded and flattened, operculum scar absent, but appearing present due to a color change between the hypanthium and the operculum. At anthesis, flowers yellow. Fruits sessile, bell- to funnel-shaped; valves at rim level.

1 (6). Eucalyptus pruinosa Schauer in Walp., Repert. Bot. Syst. 2(5): 926. 1843.

Common name: silver box or silverleaf box.

Voucher: U.S.A. California, *Ritter 47* (OBI).

Native to: North Australia, Northern Queensland, North West Australia.

Mallees, occasionally small trees; bark rough, gray, flaky, hard, rough to the smallest branches; branchlets glaucous, square in cross-section, pith lacking oil glands; crown of mature tree composed of juvenile leaves. Crown leaves opposite, sessile, concolorous, entire, not fused, ovate to elliptical, glaucous, wrapping around the stem at the base. Inflorescences compound, at branch tips. Operculum conical, operculum scar present. At anthesis, flowers cream-colored; all stamens with anthers. Fruits cylindrical; valves near rim level or slightly exserted.

5 (23′). Eucalyptus pseudoglobulus Naudin ex Maiden, Crit. Rev. Eucalyptus 8: 28. 1929.

Common name: Victorian eurabbie.

Voucher: U.S.A. California, *E. F. Constable 7403* (UC).

Native to: Victoria.

Trees; bark smooth, usually with imperfectly shed rough bark on the basal area of trunk. Leaves alternate, concolorous, lanceolate and sickle-shaped, dark green. Inflorescences axillary umbels; peduncle stout; buds 3 per umbel, stoutly pedicellate, glaucous or not; operculum warty, flattened, with a central knob, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits shortly pedicellate or sessile, funnel- to bell-shaped; valves at rim level or slightly exserted.

8 (24). Eucalyptus pterocarpa C. A. Gardner ex P. J. Lang, Fl. Australia 19: 510. 1988.

Common name: Norseman gum.

Voucher: Western Australia, 8.7 km W on rd. 10.9 km NW of Norseman, *G. M. Chippendale 154* (type, CANB, not seen).

Native to: South West Australia.

Small trees; lacking a lignotuber; bark smooth, pinkish gray or white; branchlet pith glandular. Leaves alternate, concolorous, lanceolate to narrowly lanceolate, glossy. Inflorescences axillary umbels; peduncles slender; buds 7 per umbel, pedicellate, conspicuously ribbed, green; operculum beaked or conical, operculum scar present; stamens inflexed in bud (bent downward under operculum). At anthesis, flowers white. Fruits funnel-shaped with prominent ribs; valves at rim level or slightly exserted.

6 (19). Eucalyptus pulchella Desf., Tabl. École Bot. 284, 408. 1829.

Common name: white peppermint.

Voucher: U.S.A. California, *Kawahara 800* (CAS).

Native to: Tasmania. Naturalized: California, New Zealand.

Trees; bark smooth. Leaves alternate, concolorous, narrowly lanceolate, smelling of peppermint when crushed; leaf side veins angling toward leaf margin, not parallel-veined. Inflorescences axillary umbels; buds 11, 15 or more per umbel, smooth, green; operculum rounded, operculum scar absent. At anthesis, flowers white; all stamens with anthers. Fruits cup-shaped, on pedicels < 0.5 cm long; valves at rim level or enclosed.

1 (12). Eucalyptus pulverulenta Sims, Bot. Mag. 46: pl. 2087. 1819.

Common name: silver-leaved mountain gum.

Voucher: U.S.A. California, *Ritter 18* (OBI).

Native to: New South Wales.

Mallees or shrubs; bark smooth, shedding in ribbons; branchlets glaucous, round in cross-section; crown of mature tree composed primarily of juvenile leaves. Crown leaves opposite, concolorous, sessile, orbicular or heart-shaped, wrapping around the stem, not fused. Inflorescences axillary umbels; buds 3 more per umbel, sessile, glaucous; operculum smooth, conical, beaked, operculum scar present. At anthesis, flowers white. Fruits sessile, cup-shaped, glaucous, < 1.5 cm wide; valves exserted or near rim level.

3 (10). Eucalyptus punctata DC., Prodr. 3: 217. 1828.

Common name: gray gum.

Voucher: U.S.A. California, *Yost & Ritter 264* (OBI).

Native to: New South Wales.

Trees; bark smooth, gray, pink, brown, orange, granular. Leaves alternate, discolorous, broadly lanceolate. Inflorescences axillary umbels; peduncle flattened; buds 7 per umbel, green; operculum conical, operculum scar present. At anthesis, flowers white. Fruits hemispherical to cup-shaped; valves exserted.

1 (12′) and 5 (18). Eucalyptus pyriformis Turcz., Bull. Soc. Imp. Naturalistes Moscou 22(2): 22. 1849.

Common name: Dowerin rose.

Voucher: Australia, 1909, *J. H. Maiden s.n.* (UC1327342).

Native to: South West Australia.

Mallees or shrubs; lignotuber present; bark smooth; branchlets glaucous, pith without oil glands. Leaves alternate, concolorous, lanceolate, dull. Inflorescences axillary umbels; peduncles stout; buds 3 per umbel, pedicellate, distinctly ribbed; operculum conical to rounded, ribbed, operculum scar present. At anthesis, flowers red, pink, or yellow. Fruits hemispherical to funnel-shaped, occasionally glaucous, > 2 cm wide; disk of fruit raised; valves at rim level.

6 (20′). Eucalyptus racemosa Cav., Icon. 4: 24. 1797.

Common name: scribbly gum.

Voucher: Australia, *L. A. S. Johnson 40158* (UC).

Native to: New South Wales, Southern Queensland.

Trees; bark smooth, with prominent scribbles in the wild, but not usually in cultivation; branchlets smooth, green or brown, not glaucous. Leaves alternate, concolorous, lanceolate to sickle-shaped; leaf side veins angling toward leaf margin, not parallel-veined. Inflorescences axillary umbels; buds 9 to 15 per umbel, round in cross-section; operculum conical, operculum scar absent. At anthesis, flowers white; some outer stamens without anthers. Fruits hemispherical, shortly pedicellate, to 0.6 cm wide and 0.7 cm long; valves near rim level.

6 (12′). Eucalyptus radiata Sieber ex DC., Prodr. 3: 218. 1828.

Common name: narrow-leaved peppermint.

Voucher: U.S.A. California, 1896, *J. H. Barber s.n.* (UC-40999).

Native to: New South Wales, Southern Queensland, Victoria.

Trees; bark rough, gray-brown, finely fibrous. Juvenile leaves opposite, sessile, narrowly lanceolate or linear, green; adult leaves alternate, concolorous, lanceolate to sickle-shaped, > 1 cm wide; leaf side veins angling toward leaf margin, not parallel-veined; leaf bases tapering evenly, or almost evenly, to the petiole. Inflorescences as axillary umbels; buds 11, 15 or more per umbel; operculum rounded, operculum scar absent. At anthesis, flowers white; all stamens with anthers. Fruits cup-shaped; valves at rim level.

6 (4′). Eucalyptus regnans F. Muell., Annual Rep. Acclim. Soc. Victoria, 20. 1870.

Common name: mountain ash.

Voucher: U.S.A. California, 1907, *H. B. Williamson s.n.* (UC607007).

Native to: Tasmania, Victoria. Naturalized: New Zealand, South Africa.

Trees; bark smooth, rough only on lower trunk, gray-brown, fibrous, then smooth gray or white on upper trunk and larger limbs. Leaves alternate, concolorous, lanceolate to sickle-shaped; leaf side veins angling toward leaf margin, sometimes parallel; leaf bases tapering to petiole unevenly (oblique), or occasionally tapering evenly to the petiole. Inflorescences paired umbels in leaf axils; buds 11 to 15, or more per umbel; operculum conical, beaked, operculum scar absent. Flowers white; all stamens with anthers. Fruits cup-shaped; valves at rim level or enclosed.

3 (20′). Eucalyptus resinifera Sm. in J. White, J. Voy. New South Wales, 231. 1790.

Common name: red mahogany.

Voucher: U.S.A. California, *Yost & Ritter 262* (OBI).

Native to: New South Wales, Queensland. Naturalized: Hawaii, New Zealand.

Trees; bark rough, thick, fibrous, reddish brown. Leaves alternate, discolorous, broadly lanceolate. Inflorescences axillary umbels; peduncles flattened; buds 7 or more per umbel; operculum conical, slightly beaked, or horn-shaped, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits pedicellate, hemispherical, 1 cm or less wide; disk of fruit ascending; valves strongly exserted, tips free at maturity.

1 (11). Eucalyptus rhodantha Blakely & H. Steedman, Proc. Linn. Soc. New South Wales, ser. 2, 63: 68. 1938.

Common name: rose mallee.

Voucher: Western Australia, Victoria Plains, near Gunyidi, Dec. 1934, *H. Steedman s.n.* (type, NSW, not seen).

Native to: South West Australia.

Mallees or shrubs; bark smooth, shedding in ribbons; branchlets glaucous, round in cross-section; crown of mature tree composed primarily of juvenile leaves. Crown leaves opposite, concolorous, sessile, orbicular or heart-shaped, wrapping around the stem, not fused. Inflorescences solitary, glaucous flowers in leaf axils; peduncle downturned; buds pedicellate, spherical, glaucous; operculum smooth, beaked, operculum scar present. At anthesis, flowers red. Fruits pedicellate, saucer- to funnel-shaped; valves exserted.

1 (2′). Eucalyptus risdonii Hook. f., London J. Bot. 6: 477. 1847.

Common name: Risdon peppermint.

Voucher: U.S.A. California, 1912, *F. Walter s.n.* (UC-170366).

Native to: Tasmania.

Trees; bark smooth, gray, white, shedding in ribbons; branchlets glaucous; crown of mature trees mostly composed of juvenile leaves. Juvenile leaves opposite, glaucous, fused at the bases, forming a ring; adult leaves alternate, concolorous, petiolate, ovate to broadly lanceolate, glaucous. Inflorescences axillary umbels; buds 9 to 15 per umbel, round in cross-section, glaucous, pedicellate; operculum smooth, rounded, operculum scar absent. At anthesis, flowers white; all stamens with anthers. Fruits pedicellate, hemispherical or cup-shaped, glaucous or not; valves enclosed.

3 (18). Eucalyptus robusta Sm., Spec. Bot. New Holland, Pt. 4: 39, pl. 13. 1795.

Common name: swamp mahogany.

Voucher: U.S.A. California, *Pollard s.n.* (CAS-556588).

Native to: New South Wales, Southern Queensland. Naturalized: Brazil, California, Florida, Hawaii, Mediterranean Basin, New Zealand, South Africa, Sri Lanka, Zimbabwe.

Trees; bark rough, thick, fibrous, reddish brown. Leaves alternate, discolorous, broadly lanceolate. Inflorescences axillary umbels; peduncles flattened; buds 9 to 15 per umbel, cream-colored; operculum conical and beaked, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits pedicellate, cylindrical to barrel-shaped; valves of the mature fruit fused across the fruit opening.

8 (3′). Eucalyptus roycei S. G. M. Carr, D. J. Carr & A. S. George, Proc. Roy. Soc. Victoria 83: 159. 1970.

Common name: Shark Bay mallee.

Voucher: Western Australia, near Hamelin Pool, 32.5 mi. [52.3 km] along Loop Rd., 64 mi. [103 km] W of Overlander Rd. House, Great Northern Hwy., 2 Mar. 1966, *E. M. Scrymgeour & S. G. M. Carr 284* (type, PERTH).

Native to: South West Australia.

Mallees or shrubs; lignotuber present; bark rough, fibrous, and flaky on lower trunk smooth, greenish brown above; branchlet pith glandular. Leaves alternate, concolorous, lanceolate. Inflorescences axillary umbels; buds 7 or 9 per umbel, square in cross-section. At anthesis, flowers pale yellow; all stamens with anthers. Fruits cylindrical, barrel-shaped, square in cross-section or 4-angled; valves enclosed.

5 (25). Eucalyptus rubida H. Deane & Maiden, Proc. Linn. Soc. New South Wales 24: 456–458, pl. 40. 1899.

Common name: blackbutt candlebark.

Voucher: U.S.A. California, *Yost & Ritter 181* (OBI).

Native to: New South Wales, Tasmania, Victoria.

Trees; bark smooth, white, powdery, with some imperfectly shed rough bark on the basal area of trunk, shedding in ribbons from smaller branches. Leaves alternate, concolorous, lanceolate to sickle-shaped. Inflorescences axillary umbels; buds 3 per umbel, glaucous or not, round in cross-section; operculum smooth, conical and beaked, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits pedicellate, hemispherical, glaucous, disk of fruit raised; valves exserted.

9 (14′). Eucalyptus rudis Endl., Enum. Pl. 49. 1837.

Common name: flooded gum.

Voucher: U.S.A. California, *Yost & Ritter 203* (OBI).

Native to: South West Australia. Naturalized: Hawaii.

Trees; bark rough, gray, fibrous, compacted, flaky to the smallest branches or occasionally smooth on the smaller branches, not shedding in ribbons. Leaves alternate, concolorous, lanceolate to ovate. Inflorescences axillary umbels; buds 7 per umbel; operculum conical or rounded, operculum scar present. At anthesis, flowers white. Fruits pedicellate, hemispherical to cup-shaped; disk of fruit broad, level; valves exserted.

3 (11′). Eucalyptus saligna Sm., Trans. Linn. Soc. London 3: 285. 1797.

Common name: Sydney blue gum.

Voucher: U.S.A. California, *H. H. Smith 4497* (UC).

Native to: New South Wales, Southern Queensland. Naturalized: Florida, Hawaii, New Zealand, South Africa, Sri Lanka, South West Australia.

Trees; bark smooth, white, powdery, with a 1–4 m stocking of flaky, gray, rough bark at the base. Leaves alternate, discolorous, lanceolate. Inflorescences axillary umbels; peduncle flattened; buds 7, 9, or 11 per umbel, not glaucous; operculum conical to beaked, operculum scar present. At anthesis, flowers

white. Fruits funnel-shaped; valves usually 4, exserted and erect, not incurved.

9 (17). Eucalyptus salmonophloia F. Muell., Fragm. 11(88): 11–12. 1878.

Common name: salmon gum.

Voucher: Australia, *H. M. Hall 75* (UC-177948).

Native to: South West Australia.

Trees; bark smooth, white, gray, coppery, salmon-pink, or orange, shiny; branchlet pith without oil glands; branchlets not glaucous. Leaves alternate, concolorous, linear to narrowly lanceolate, glossy. Inflorescences axillary umbels; buds 7 or more per umbel; operculum rounded, operculum scar present. At anthesis, flowers white. Fruits hemispherical; valves thin, needle-like, exserted.

9 (16′). Eucalyptus salubris F. Muell., Fragm. 10(83): 54. 1876.

Common name: gimlet.

Voucher: Australia, 1909, *J. H. Maiden s.n.* (UC-447035).

Native to: South West Australia. Naturalized: Queensland, South Africa.

Small trees or shrubs, lacking a lignotuber; bark smooth, tan or coppery, shiny; branchlet pith glandular; branchlets not glaucous. Leaves alternate, concolorous, lanceolate to narrowly lanceolate, glossy. Inflorescences axillary umbels; buds 7 per umbel; operculum rounded, operculum scar present. At anthesis, flowers white. Fruits hemispherical; valves exserted.

9 (19′). Eucalyptus scoparia Maiden, Proc. Linn. Soc. New South Wales, 29: 777–778. 1905.

Common name: Wallangara white gum.

Voucher: Australia, *E. F. Constable NSW 56603* (UC).

Native to: New South Wales, Southern Queensland.

Trees; bark smooth, powdery to the touch, white, gray, mottled; branchlet pith without oil glands. Leaves alternate, concolorous, lanceolate, narrowly lanceolate, sickle-shaped, glossy, green. Inflorescences axillary umbels; buds 7 per umbel; operculum conical to beaked, operculum scar present. At anthesis, flowers white. Fruits hemispherical; valves exserted.

5 (15′). Eucalyptus serraensis P. Y. Ladiges & T. Whiffin, Austral. Syst. Bot. 6(4): 367. 1993.

Common name: Grampians stringybark.

Voucher: Australia, Grampians, Vic., just N of carpark at Sundial Turntable, on a rocky outcrop, 30 Apr. 1987, *M. R. Newnham & P. Y. Ladiges 943* (type, MEL).

Native to: Victoria.

Mallees or occasionally trees; bark rough, fibrous, hard; young branches warty, glaucous. Leaves alternate, concolorous, lanceolate to ovate, glossy, thick. Inflorescences axillary umbels; buds 3 per umbel, wrinkled and warty; operculum rounded, warty, operculum scar absent. At anthesis, flowers white. Fruits hemispherical, sessile; valves exserted.

2 (7′). Eucalyptus siderophloia Benth., Fl. Austral. 3: 220. 1866 [1867].

Common name: ironbark.

Voucher: U.S.A. California, 1908, *N. S. Ingham s.n.* (UC-1552463).

Native to: New South Wales, Queensland.

Trees; bark rough, ironbark type, deeply furrowed, hard, dark brown, gray, or black, retained on trunk and limbs. Leaves alternate, concolorous, lanceolate. Inflorescences compound, at branch tips; buds with operculum conical, equal in length to the hypanthium, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits cup- or barrel-shaped, 0.5–0.7 cm wide; valves slightly exserted or at rim level.

2 (4). Eucalyptus sideroxylon A. Cunn. ex Woolls., Proc. Linn. Soc. New South Wales, ser. 2, 1(3): 859–860. 1886.

Common name: red ironbark.

Voucher: U.S.A. California, *McClintock s.n.* (CAS-863986).

Native to: New South Wales, Southern Queensland, Victoria. Naturalized: California, Hawaii, Mediterranean Basin, New Zealand, South Africa.

Trees; bark rough, ironbark type, deeply furrowed, hard, dark brown, gray, or black, retained on trunk and limbs. Leaves alternate, concolorous, lanceolate, dull, bluish green, occasionally glaucous. Inflorescences axillary umbels; buds 7 per umbel, ovoid, on slender pedicels; operculum conical to beaked, operculum scar absent. At anthesis, flowers white, pink, or red; outer stamens without anthers. Fruits cup-shaped; valves enclosed.

2 (4′) and 6 (8). Eucalyptus sieberi L. A. S. Johnson, Contr. New South Wales Natl. Herb. 3: 125. 1962.

Common name: silvertop ash.

Voucher: U.S.A. California, *H. H. Smith 4510* (UC).

Native to: New South Wales, Tasmania, Victoria. Naturalized: New Zealand, South Africa.

Trees; bark rough, gray-brown, furrowed, hard, retained on trunk and larger limbs. Leaves alternate, concolorous, lanceolate, glossy; leaf side veins angling toward leaf margin, not parallel-veined. Inflorescences axillary umbels; buds 7 to 15 per umbel; operculum rounded and flattened, operculum scar absent. At anthesis, flowers white; outer stamen without anthers. Fruits barrel-shaped; valves at rim level or enclosed.

9 (10′). Eucalyptus smithii R. T. Baker, Proc. Linn. Soc. New South Wales 24: 292–294, tab. 20. 1899.

Common name: blackbutt peppermint.

Voucher: Australia, 1924, *W. A. W. de Beugerville s.n.* (UC-283216).

Native to: New South Wales, Victoria.

Trees; bark rough, compact, brown or gray, shed as ribbons from the upper limbs; branches not glaucous. Leaves alternate, concolorous, lanceolate. Inflorescences axillary umbels; buds 7 per umbel, diamond-shaped, green; operculum conical to beaked, operculum scar present. At anthesis, flowers white. Fruits pedicellate, cup-shaped; disk of fruit prominent, clearly ascending; valves exserted.

8 (23). Eucalyptus spathulata Hook., Hooker's Icon. Pl. 7: tab. 611. 1844.

Common name: swamp mallet.

Voucher: U.S.A. California, *Yost & Ritter 365* (OBI).

Native to: South West Australia.

Trees; bark smooth, shiny, satiny, coppery, bronze to steely gray; branchlet pith glandular. Leaves alternate, concolorous, linear, glossy. Inflorescences axillary umbels; buds 7 per umbel; operculum horn-shaped, all stamens erect when in bud (not bent under operculum), operculum scar present. At anthesis, flowers white. Fruits cup-shaped; valves at rim level.

5 (21). Eucalyptus steedmanii C. A. Gardner, J. Roy. Soc. Western Australia 19: 87. 1933.

Common name: Steedman's mallet.

Voucher: Western Australia, Forrestania, S of Southern Cross, Feb. 1928, *H. Steedman s.n.* (type, PERTH).

Native to: South West Australia.

Trees; bark smooth, satiny, bronze, pink, and gray; branchlet pith glandular. Leaves alternate, concolorous, elliptical to lanceolate, glossy. Inflorescences axillary umbels; buds 3 per umbel; pedicellate, square in cross-section, winged; operculum conical. At anthesis, flowers white; all stamens with anthers. Fruits funnel-shaped, square in cross-section, winged; valves at rim level or exserted.

6 (6′). Eucalyptus stellulata Sieber ex DC., Prodr. 3: 217. 1828.

Common name: black sally.

Voucher: U.S.A. California, *C. T. White 11491* (UC).

Native to: New South Wales, Victoria.

Trees; bark rough, gray-brown, on lower part of the trunk. Leaves alternate, concolorous, lanceolate; leaf side veins nearly parallel and prominently 3-veined. Inflorescences axillary umbels; buds 9 to 15 per umbel, spindle-shaped and in starlike clusters; operculum conical, operculum scar absent. At anthesis, flowers white; all stamens with anthers. Fruits cup-shaped to globose; valves at rim level or enclosed.

5 (3). Eucalyptus stoatei C. A. Gardner, J. Roy. Soc. Western Australia 22: 126. 1936.

Common name: scarlet pear gum.

Voucher: Western Australia, Bandalup Creek near Kundip, June 1935, *K. F. Dureau & J. E. Harrison s.n.* (type, PERTH).

Native to: South West Australia.

Small trees or shrubs, lacking a lignotuber; bark smooth, pale gray, shedding in strips; branchlet pith without oil glands. Leaves alternate, concolorous, elliptic to lanceolate, glossy. Inflorescences solitary flowers in leaf axils; peduncles slender; buds bright red, round in cross-section, pear-shaped with many ribs, pedicellate; operculum conical, operculum scar present. At anthesis, flowers yellow. Fruits barrel-shaped, ribbed; valves enclosed.

7 (12). Eucalyptus stricklandii Maiden, J. Nat. Hist. Sci. Soc. Western Australia 3(2): 175. 1911.

Common name: Strickland's gum.

Voucher: U.S.A. California, *Yost & Ritter 325* (OBI).

Native to: South West Australia.

Trees; bark rough, flaky, gray, brown, and black on the lower part of the trunk, smooth on upper trunk and limbs; branches often steeping ascending; branchlet pith glandular. Leaves alternate, concolorous, lanceolate, glossy, thick. Inflorescences axillary

umbels; peduncles broad, flattened, glaucous; buds 7 per umbel, sessile, not glaucous; operculum rounded and conical, operculum scar present. At anthesis, flowers white. Fruits sessile, funnel-shaped to bell-shaped; valves at rim level or slightly exserted.

7 (7). Eucalyptus talyuberlup D. J. Carr & S. G. M. Carr, Austral. J. Bot. 28(5–6): 543, figs. 6e, 36. 1980.

Common name: pretty yate.

Voucher: Australia, Western Australia, Stirling Range Nat. Park, Stirling Range Drive, 10 Aug. 1974, *D. J. Carr & S. G. M. Carr 1974* (type, PERTH).

Native to: South West Australia.

Trees or mallees; lignotuber present; bark smooth, pale gray; branchlet pith without oil glands. Leaves alternate, concolorous, narrowly lanceolate, glossy. Inflorescences axillary umbels; peduncles broad, flattened, and straplike; buds 7 or more per umbel, free at the base, green; operculum smooth or slightly warty, operculum scar present. At anthesis, flowers yellow to chartreuse. Fruits sessile, free at the base, funnel- to bell-shaped, valves exserted, tips connected at maturity.

9 (22′). Eucalyptus tereticornis Sm., Spec. Bot. New Holland, Pt. 4: 41–42. 1795.

Common name: forest red gum.

Voucher: U.S.A. California, *Boyd s.n.* (CAS-931360).

Native to: New South Wales, Queensland, Victoria. Naturalized: California, Hawaii, India, Mediterranean Basin, New Zealand, South Africa, Zimbabwe.

Trees; bark smooth, not powdery to the touch, usually with some imperfectly shed, rough gray bark on the basal area of trunk; branches often steeply ascending; branchlet pith without oil glands. Juvenile leaves opposite for fewer than 5 pairs; adult leaves alternate, concolorous, lanceolate. Inflorescences axillary umbels; buds 7 per umbel; operculum horn-shaped or conical, not beaked, 2× longer than hypanthium, operculum scar present. At anthesis, flowers white. Fruits hemispherical; valves exserted.

5 (4). Eucalyptus tetraptera Turcz., Bull. Soc. Imp. Naturalistes Moscou 22(2): 22. 1849.

Common name: square-fruited mallee.

Voucher: U.S.A. California, *P. Ashley s.n.* (OBI-52779).

Native to: South West Australia.

Mallees or shrubs; lignotuber present; bark smooth, pale gray, sometimes with persistent ribbons on the branches; branchlets square in cross-section, pith without oil glands. Leaves alternate, concolorous, broadly lanceolate, thick, glossy. Inflorescences solitary flowers in leaf axils; peduncles flat, stout, downturned; buds bright red, square in cross-section, with 4 wings, sessile; operculum conical, operculum scar present. At anthesis, flowers red. Fruits square in cross-section, winged, > 2.5 cm wide; valves enclosed.

8 (28). Eucalyptus torquata Luehm., Vict. Naturalist 13: 147. 1897.

Common name: coral gum.

Voucher: U.S.A. California, *Keil 11872-6* (OBI).

Native to: South West Australia.

Trees; bark rough, scaly, dark, fibrous on lower trunk, smooth above; branchlet pith glandular. Leaves alternate, concolorous, lanceolate, dull, bluish green. Inflorescences axillary umbels; buds 7 per umbel, cylindrical with prominent ribs at the base; operculum beaked with an expanded, ribbed base, operculum scar present. At anthesis, flowers pink; all stamens with anthers. Fruits pedicellate, cylindrical, ribbed; valves enclosed.

1 (14) and 5 (29). Eucalyptus urnigera Hook. f., London J. Bot. 6: 477–478. 1847.

Common name: urn gum.

Voucher: U.S.A. California, *Ritter 83* (OBI).

Native to: Tasmania.

Trees; bark smooth; branchlets glaucous; crown of mature tree composed of juvenile and adult leaves. Juvenile leaves opposite, glaucous, sessile, entire, orbicular, free; adult leaves alternate, concolorous, lanceolate to elliptical, dull, blue-green, glaucous, petiolate, entire. Inflorescences axillary umbels; peduncles as long as or longer than buds, often downturned; buds 3 per umbel, glaucous, round in cross-section; operculum smooth, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits glaucous, urn-shaped, shortly pedicellate; valves enclosed.

3 (9′). Eucalyptus urophylla S. T. Blake, Austrobaileya 1(1): 7. 1977.

Common name: Timor mountain gum.

Voucher: U.S.A. California, *Turnbull 210* (type, FRI, not seen).

Native to: Indonesia, East Timor. Naturalized: Hawaii.

Trees; bark rough, fibrous, scaly, reddish brown on lower trunk, smooth on upper trunk and limbs. Leaves alternate, discolorous, broadly lanceolate.

Inflorescences axillary umbels; peduncle slightly flattened; buds 7 or more per umbel; operculum conical; operculum scar present. At anthesis, flowers white. Fruits cup-shaped; valves at rim level or slightly exserted.

7 (20). Eucalyptus utilis Brooker & Hopper, Nuytsia 14(3): 349, figs. 6, 7. 2002.

Common name: coastal moort.

Voucher: U.S.A. California, *Kelch 06538* (OBI).

Native to: South West Australia.

Small trees or shrubs; bark smooth, gray to coppery; branchlet pith glandular. Leaves alternate, concolorous, lanceolate (usually > 5× longer than wide), glossy. Inflorescences axillary umbels; peduncles broad, flattened, and straplike; buds 7 per umbel, ridged; operculum conical or horn-shaped; all stamens erect when in bud (not bent under operculum), operculum scar present. At anthesis, flowers white or cream-colored. Fruits sessile, barrel- to funnel-shaped; valves at rim level.

This species is often erroneously sold under the name *Eucalyptus platypus* var. *heterophylla* Blakely.

5 (11). Eucalyptus vernicosa Hook. f., London J. Bot. 6: 478. 1847.

Common name: varnished gum.

Voucher: Australia, Mt. Fatigue, Tasmania, 4 Apr. 1842, *R. Gunn 1113* (type, K, not seen).

Native to: Tasmania.

Shrubs; lignotuber present; bark smooth, gray. Leaves alternate, concolorous or slightly discolorous, orbicular to ovate, crowded on the the stem, < 4 cm long. Inflorescences axillary umbels; buds 3, occasionally 1, per umbel; operculum smooth, conical, operculum scar present. At anthesis, flowers white. Fruits hemispherical, sessile; valves near rim level.

5 (26). Eucalyptus viminalis Labill., Nov. Holl. Pl. 2: 12–13, tab. 151. 1806.

Common name: manna gum or ribbon gum.

Voucher: U.S.A. California, *Keil 25866* (OBI).

Native to: New South Wales, South Australia, Tasmania, Victoria. Naturalized: California, Hawaii, New Zealand, South Africa.

Trees; bark smooth, occasionally with short stocking of rough bark; smooth bark white, gray, or cream, shedding in ribbons. Juvenile leaves lanceolate, green, sessile; adult leaves alternate, concolorous, lanceolate. Inflorescences axillary umbels; buds 3 per umbel, round in cross-section, green; operculum conical, smooth, operculum scar present. At anthesis, flowers white; all stamens with anthers. Fruits cup-shaped, not glaucous, disk raised; valves exserted.

8 (15). Eucalyptus viridis R. T. Baker, Proc. Linn. Soc. New South Wales 25: 316–319, pl. 19. 1900.

Common name: green mallee.

Voucher: U.S.A. California, *Yost & Ritter 300* (OBI).

Native to: New South Wales, South Australia, Southern Queensland, Victoria.

Mallees; bark rough, gray, short-fibered, hard; branchlet pith without oil glands. Leaves alternate, concolorous, narrowly lanceolate to linear, green, entire. Inflorescences axillary umbels; buds 7, 9, or 11 per umbel, round in cross-section, green; operculum rounded or conical, operculum scar absent. At anthesis, flowers white; all stamens with anthers. Fruits pedicellate, cup-shaped; valves enclosed or near rim level.

7 (16′). Eucalyptus wandoo Blakely, Key Eucalypts, 112. 1934. Basionym: *Eucalyptus redunca* var. *elata* Benth., Fl. Austral. 3: 253. 1867. Blocking name: *Eucalyptus elata* Dehnh., Cat. Horti Camald. 26. 1829.

Common name: wandoo.

Voucher: U.S.A. California, *Yost & Ritter 355* (OBI).

Native to: South West Australia.

Trees; bark smooth, flaky, mottled, white, pale gray, cream; branchlet pith glandular. Leaves alternate, concolorous, lanceolate, dull, slightly blue-green. Inflorescences axillary umbels; peduncles flattened, green; buds 11 or more per umbel; operculum horn-shaped, operculum scar present. At anthesis, flowers white. Fruits cylindrical to barrel-shaped; valves enclosed or at rim level.

8 (22). Eucalyptus woodwardii Maiden, J. Nat. Hist. Sci. Soc. Western Australia 3(1): 42–43. 1910.

Common name: lemon-flowered gum.

Voucher: U.S.A. California, *Yost & Ritter 368* (OBI).

Native to: South West Australia.

Trees; lignotuber absent; bark smooth, white, shedding in ribbons. Leaves alternate, concolorous, lanceolate, dull, grayish green. Inflorescences axillary umbels; buds 7 per umbel, glaucous, pedicellate; operculum beaked, operculum scar present. At anthesis, flowers yellow. Fruits bell- to funnel-shaped; valves enclosed or at rim level.

5 (17′). Eucalyptus youngiana F. Muell., Fragm. 10(81): 5–6. 1876.

Common name: large-fruited mallee.

Voucher: Western Australia, Queen Victoria Spring, 1875, *J. Young s.n.* (type, MEL).

Native to: South Australia, South West Australia.

Mallees or shrubs; bark rough, fibrous on trunk, smooth, white on smaller branches; branchlet pith without oil glands. Leaves alternate, concolorous, lanceolate, dull, bluish green. Inflorescences axillary umbels; peduncles stout; buds 3 per umbel, distinctly ribbed, pedicellate; operculum conical, beaked, ribbed, operculum scar present. At anthesis, flowers red, pink, or yellow. Fruits disk shaped, > 3 cm wide.

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